

The AUTOMOBILE

Massachusetts the Tourists' Goal

MASSACHUSETTS is the Mecca of the summer motorist. With its many miles of coast offering the lure of ocean breezes during the torrid season of the year and its miles of mountain and forest land liberally strewn with beautiful lakes, it only needs the added touch of good roads to bring tourists from all over the country and not a few from foreign lands. Realizing the immense profit that this influx of visitors means to the commonwealth, it is but reasonable to suppose that those who control the legislation will do all in their power to throw open the doors to those who travel by automobile. In the following article an idea is given of the great number of tourists attracted to this state and of the way this number is increasing each year. Of course the figures for 1913 are incomplete.

A Million Dollars Left Annually in the Bay State by Non-Resident Automobile Tourists—800 Registrations This Year

BOSTON, MASS., Aug. 18—\$1,000,000 was left in the State of Massachusetts annually by motor visitors of outside states.

There are 800 non-resident cars registered in the state this season to date, these cars remaining longer than the 10-day non-resident privilege afforded. For every non-resident car which registers there are twenty-five other non-resident cars which do not register because they are only remaining in Massachusetts 4 or 5 days.

Proceeding on a conservative estimate, it means that at least 20,000 non-resident machines pass through the state of Massachusetts this summer. Averaging three persons to the car makes a visiting total of 60,000 summer tourists. Placing the expense of each at a very low estimate, \$10, gives \$600,000 spent by these visitors for food and lodging. To this total add the money spent for tires, garaging, gasoline, oil and the various other incidentals and the total is brought quite close to the million mark.

With non-resident motorists spending this amount each year in the state it is a good argument for lifting the restrictive 10-day clause for non-residents now in force.

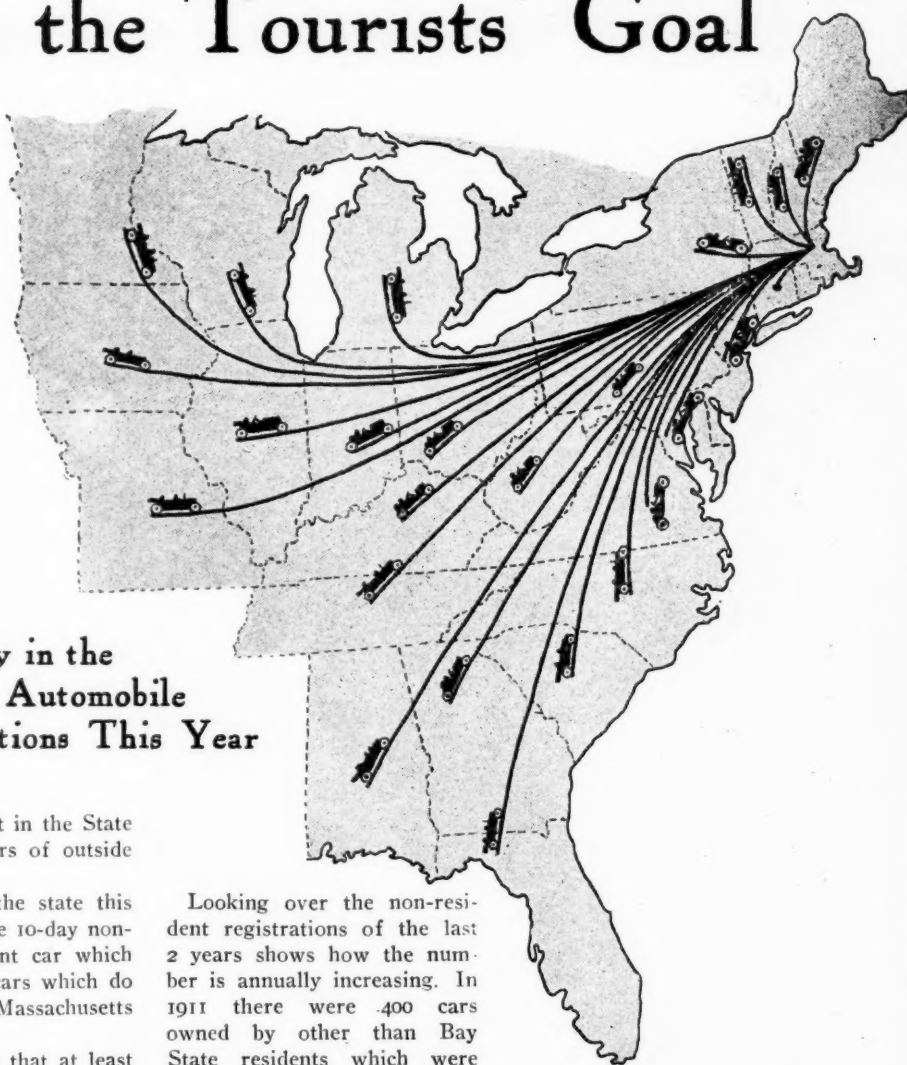
Looking over the non-resident registrations of the last 2 years shows how the number is annually increasing. In 1911 there were 400 cars owned by other than Bay State residents which were registered in that state.

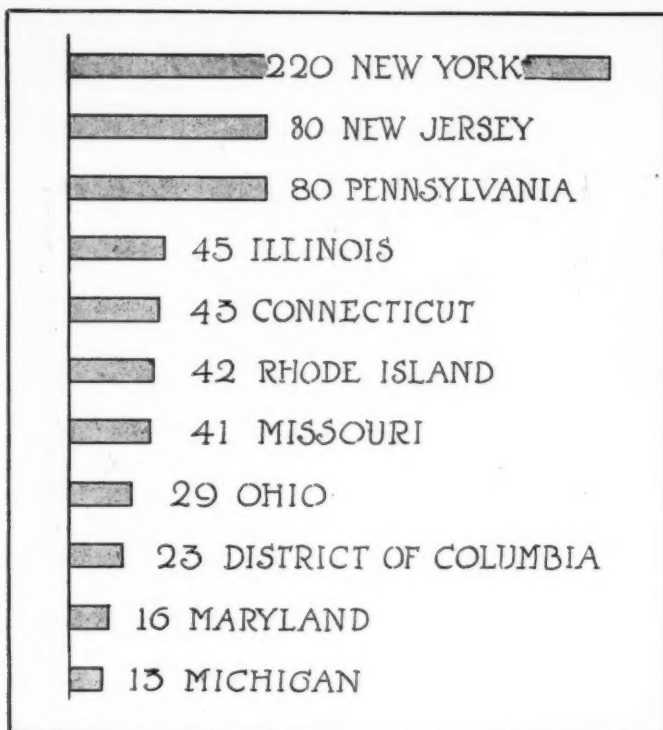
In 1912 these non-resident registrations increased to 700.

For 1913, with the season approaching the end of the registration period, the figures total over 800.

In computing the amount of money left in the state by non-residents who registered it must be remembered that these cars are owned by motorists who plan to remain longer than 10 days in the state.

There is not a day passes now but a person may stand for a few minutes outside some of the prominent hotels and note cars from many other states either stopping to let guests out or





Registrations of non-residents in Massachusetts for 1913

starting away, continuing the motor tour. One does not have to resort to guess work to learn what sections are represented, for the average is found in the registration figures.

Last year there were twenty-nine states represented in the list. This year there are thirty-one states, and out of all the unregistered thousands it is quite probable that very few of the whole forty-nine states and territories within the borders of the United States were not represented by one or more cars. In making comparisons it is found that while two states represented last year, namely, Alabama and Colorado, are missing this year, yet there are four new ones, thereby doubling on the missing two, these additions being Delaware, North Carolina, South Carolina and West Virginia. The Pacific Coast is represented by California, and while Alabama is out, the Gulf of Mexico is represented by Texas, Florida and Louisiana. Last year Honolulu and Brazil were on the list with Cuba, Puerto Rico and Canada, but this year while Cuba and Canada are represented the others are missing, but Great Britain is added, making up in a measure for the loss of faraway residents.

The figures for the different states are interesting. New York, with its prepondering list of motorists, and the state being so near Massachusetts, naturally is the leader. As a matter of fact New York contributes 220 cars, or more than 25 per cent. of the

whole number. This 220 is an increase of eleven cars over 1912, the 209 of last year being also more than 25 per cent. of that year's figures, making the Empire State the leader.

This year New Jersey and Pennsylvania are tied for second place with eighty cars each. A year ago New Jersey had fifty-six and Pennsylvania had seventy-eight, a big gain for the former state. In the past few years New Jersey motorists were not welcomed here because of that state's own restrictive laws.

Illinois jumps from eighth place last year with thirty-nine cars to fourth place with forty-five this year. These four states contributed more than 50 per cent. of the total registered.

Rather curiously, both Connecticut and Rhode Island have the same number registered now as they did a year ago, the former forty-three and the latter forty-two.

Territorially grouping the states gives some clearer idea of the visiting motorists, for all but one section show a gain of some kind. The New England group presents these figures, showing a gain of six:

NEW ENGLAND GROUP		
	1912	1913
Connecticut	43	43
Rhode Island	42	42
New Hampshire	12	10
Maine	3	6
Vermont	2	4
Totals	99	105

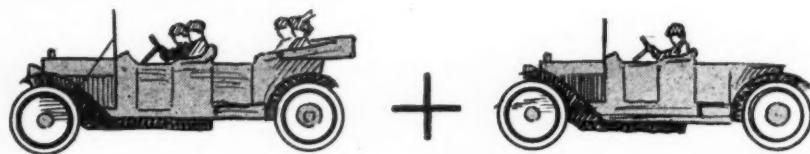
New York, being in a class by itself with more than 25 per cent. of the total, is eliminated from the next group, comprising the Atlantic Coast states. These states show a gain of from eighty-seven to 120, or about 33 per cent., as follows:

ATLANTIC COAST GROUP		
	1912	1913
New Jersey	56	80
Maryland	17	16
Florida	13	8
Virginia	5	5
Louisiana	4	3
Delaware	0	2
North Carolina	0	2
South Carolina	0	2
Georgia	1	2
Totals	87	120

There are eight states grouped in the Middle West section, and this is the only one of the centers showing a loss. There is a drop of four cars, so that it is more than made up by any one of the other groups. These states and their figures follow:

MIDDLE WEST GROUP		
	1912	1913
Illinois	39	45
Missouri	40	41
Ohio	40	29
Michigan	15	13
Iowa	2	5
Minnesota	2	4
Indiana	7	3
Wisconsin	1	2
Totals	146	142

Another group may be arranged by taking the states that are along the border line of the north and south, stretching along to the Mississippi. This group also shows a gain, not much to be



The parties are divided very evenly among two-passenger roadsters and five-passenger touring cars, giving an average of 3.5 people per car

NUMBER OF CARS, 2

= 3.5 PEOPLE
PER CAR
AVERAGE

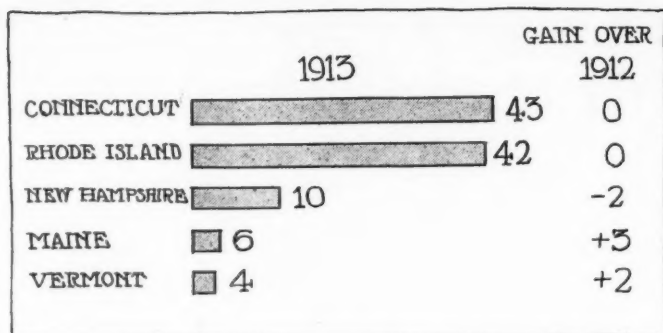


Diagram showing number of automobiles visiting Massachusetts from states in the New England group during 1912 and 1913 to date

sure, only seven cars, from eighty-eight to ninety-five. But for purposes of comparison it is enough. There are only four states in the group, and the figures are as follows:

BORDER LINE GROUP		
	1912	1913
Pennsylvania	78	80
West Virginia	0	1
Kentucky	4	9
Tennessee	6	5
Totals	88	95

That leaves but one more group, the states west of the Mississippi river. This group is naturally small, owing to the distance the motorists have to travel to get here, but they show a proportionate gain over last year, as follows:

FAR WEST GROUP		
	1912	1913
Texas	8	10
Kansas	1	9
Nebraska	4	3
California	7	4
Totals	20	26

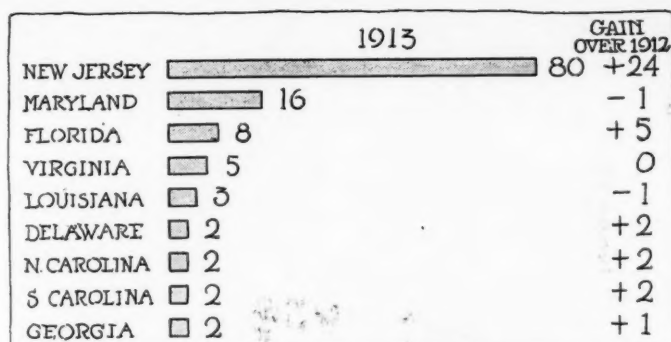
For purposes of recapitulation, the figures show that there were fifty-nine more machines than were registered last year among these groups, as follows:

	1912	1913
New England Group	99	105
Atlantic Coast Group	87	120
Middle West Group	146	142
Border Line Group	88	95
Far West Group	20	26
Totals	452	511

The above figures tell a very complete story. Further proof that New England is the paradise of the motorists is shown by a compilation made on the highways leading into Maine, and, taken together with the Massachusetts registration figures, gives the most complete idea of what a great vehicle of travel the motor car has become.

At Portland, Me., a few weeks ago a census was taken to note compilation made on the highways leading into Maine, and, taken by way of the through route from Massachusetts, and if the figures could be secured from the road leading from Bretton Woods many more cars and people could be added. These figures were compiled only between 8 a. m. and 6 p. m. on the days noted. They are interesting, for they show that with 620 cars, carrying 2,357 passengers, entering the state in 3 days, it means many more thousands all summer, and that the cars now average less than four to a car instead of five and six in the old days, when every one was invited for a ride. Following are the tabulated figures:

SUNDAY, JULY 20		
	CARS	PERSONS
Massachusetts	94	361
New Hampshire	32	373
Vermont	3	7
Rhode Island	2	6
Connecticut	2	7
New York	14	46
New Jersey	7	20
Pennsylvania	3	9
New Brunswick	1	4
Missouri	1	5
Totals	209	838



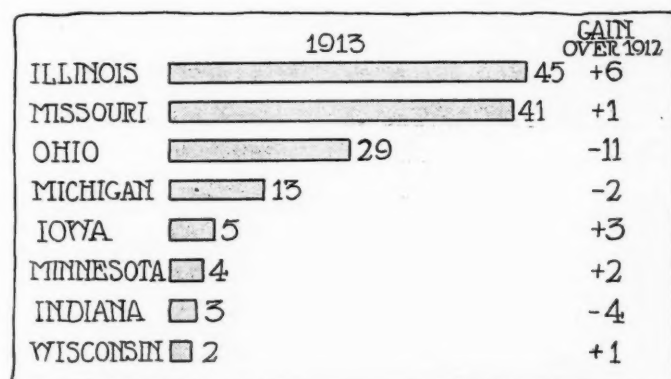
Number of cars carrying automobile tourists registered in the state of Massachusetts as visitors from the Atlantic Coast group

SATURDAY, JULY 26

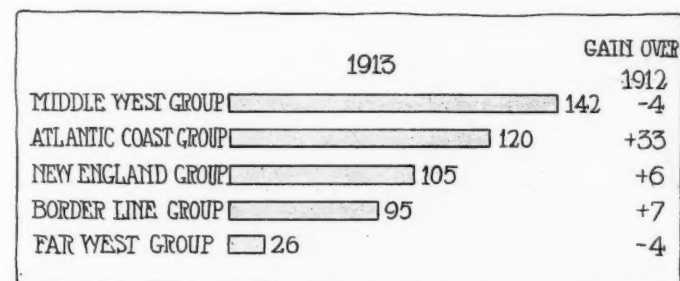
	CARS	PERSONS
Massachusetts	118	311
New Hampshire	32	118
Vermont	2	10
Rhode Island	4	14
Connecticut	5	16
New York	10	39
New Jersey	4	7
Pennsylvania	10	34
Maryland	11	37
Ohio	3	14
Wisconsin	1	2
New Brunswick	1	4
Quebec	2	10
Totals	203	617

SUNDAY, JULY 27

	CARS	PERSONS
Massachusetts	102	438
New Hampshire	75	310
Vermont	2	8
Rhode Island	5	24
Connecticut	2	9
New York	12	48
New Jersey	7	16
Pennsylvania	6	23
Maryland	5	17
Quebec	2	9
Totals	218	902



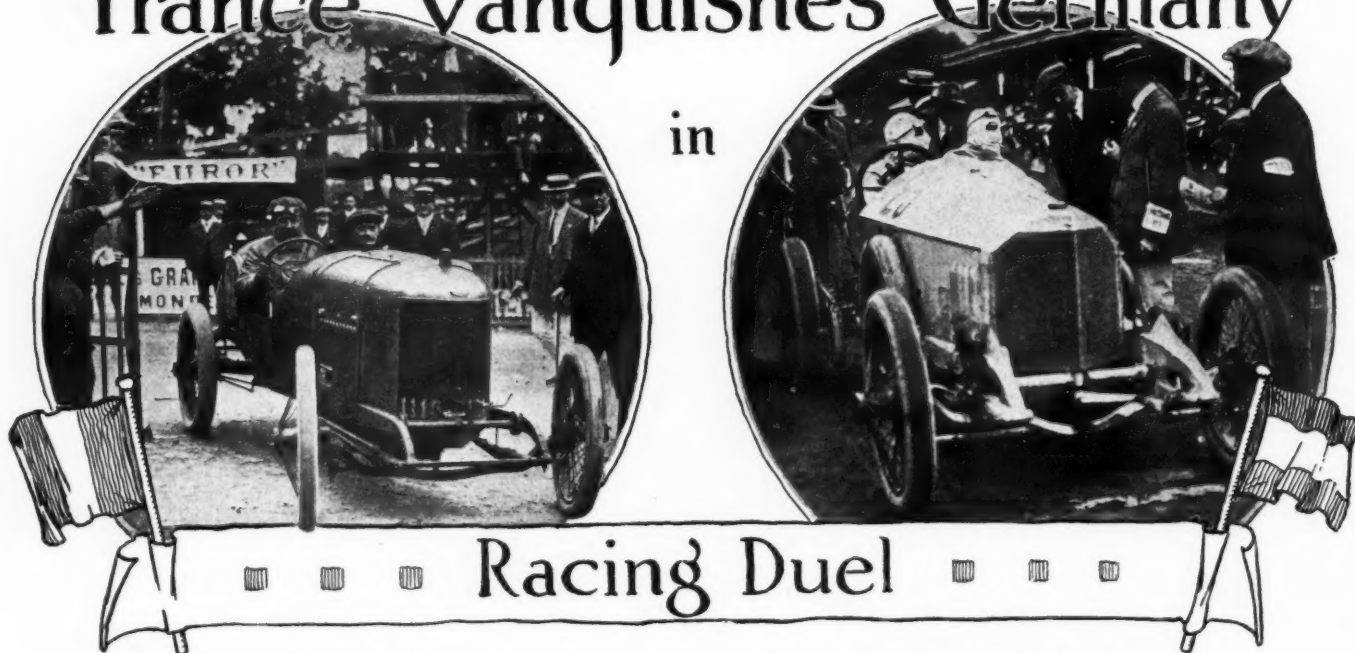
Cars visiting the Bay State in 1912 and 1913 to date from states in the Middle West group, as shown by the registration figures



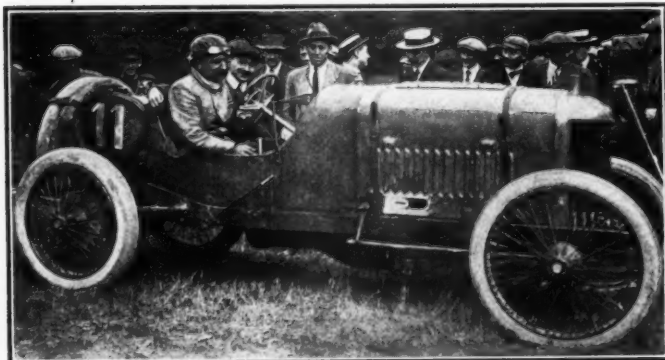
Comparison of the various important state groups sending many automobiles to Massachusetts on summer tours in 1912 and 1913 to date

France Vanquishes Germany

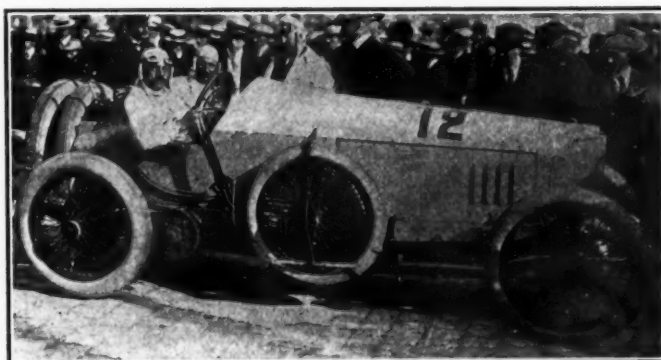
in



Bablot in the Delage in which he won the Sarthe Grand Prix. Pilette in the Mercedes which took third place



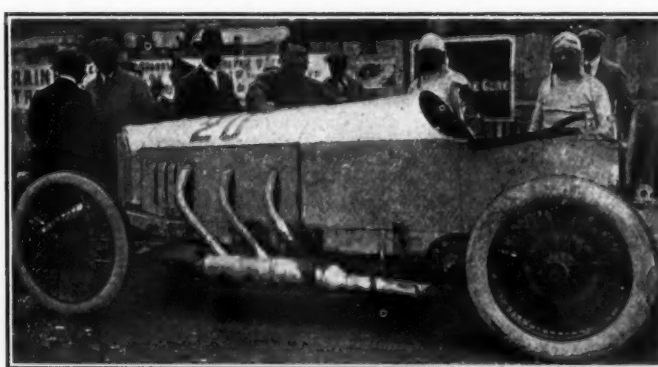
Bablot and Molon, his aviator-mechanician, after the race



Salzer, who finished fourth in the new Mercedes six



Start of the Sarthe Grand Prix race at Le Mans



Lautenschlager, who finished sixth, and his Mercedes six

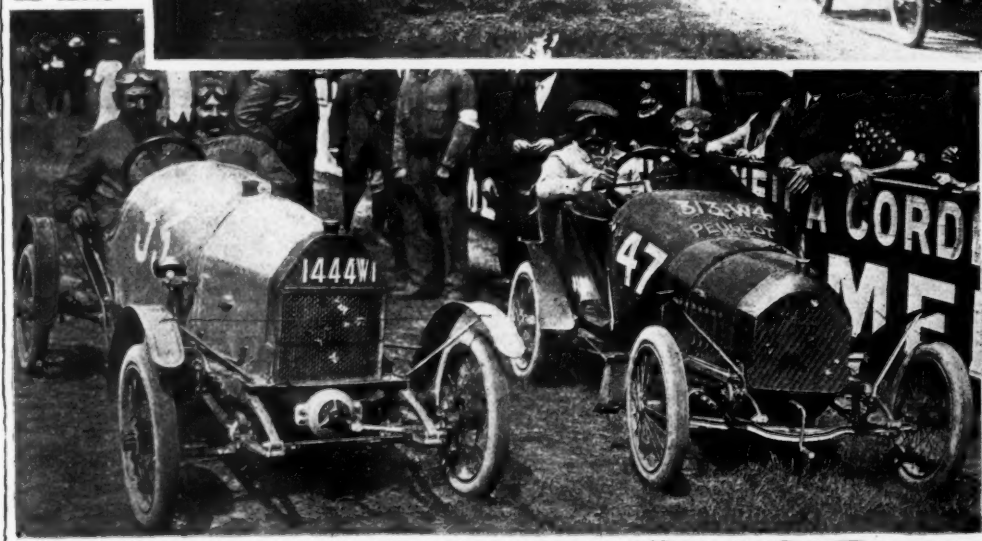
LE MANS, France, Aug. 7—Having covered the 335.5 miles of the Le Mans course in 4 hours 21 minutes 50 seconds, Bablot, the Delage pilot, is now not only the speed king of France, but of Europe as well. For the race was more than an ordinary contest; it was a duel between German and French. Having covered the first lap at almost 80 miles an hour, Bablot lost to his teammate Guyot, but the latter fell back again due to tire changes after the third lap. Bablot covered the third lap at 82 miles an hour, the fourth at 82.6. Up to the fifth turn, the three Delages held first, second and third places; then

Pilette's Mercedes pushed ahead, gaining third, then second position. After the ninth lap, Bablot led Pilette by 6 minutes and Guyot by 7. So he changed tires but the motor refused to start. One mechanic failed to start it; a second followed him, but was too weak; a strong man tried, but in vain. It was a heart-rending moment. Suddenly Leon Molon, aviator and driver of a Vinot-Deguingand that had dropped out, spun the motor. Off they went to regain the lost lead on the Mercedes. The lap was made at 85 miles an hour from a standing start. Thus Bablot won. Guyot was second.

Europe Holds Second Cycle Car Race



Top—Start of Europe's second cycle car race held recently at Le Mans, France. The cars were sent away on the open road as in the Indianapolis race last Memorial Day, there being ten cycle cars in the first group and seven in the second, the latter of unlimited weight.



Left—The winners of the limited weight division of the cycle car race at Le Mans. At the left is Violet in the Violet-Bogey in which he won the contest at an average of 46 miles an hour, and at the right is the little Baby Peugeot, driven by Bas, which was a very close second. Violet lost the lead on the fourth lap but regained it.

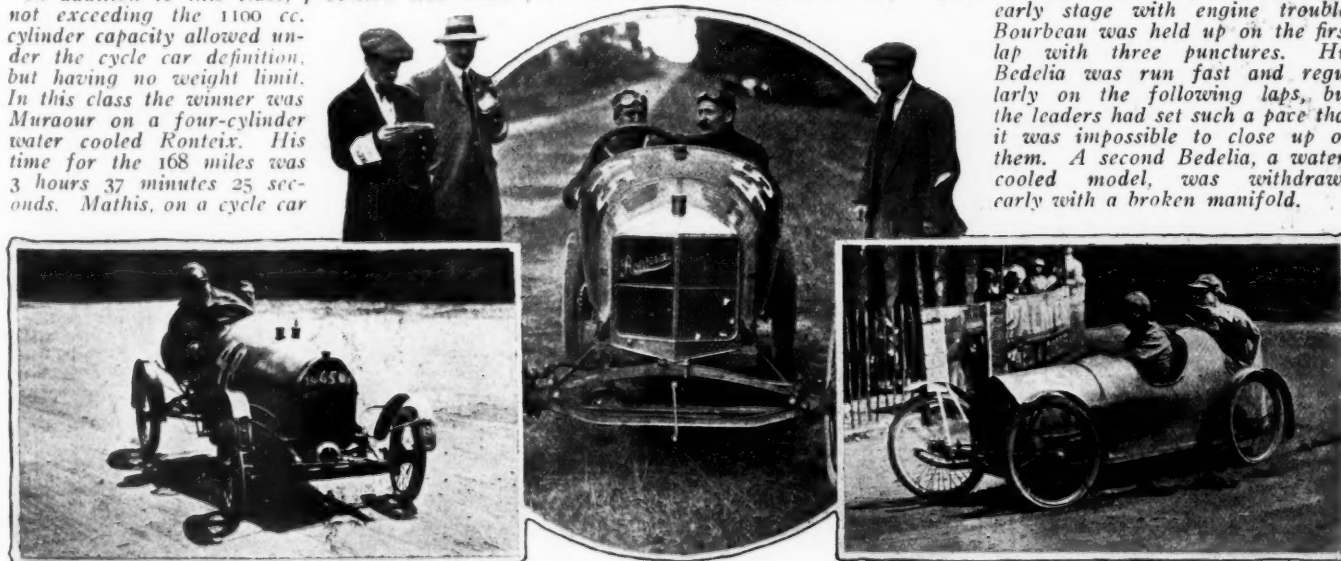
LE MANS, France, Aug. 7—Violet on a twin-cylinder Violet-Bogey won the second cycle car race in France run in connection with the Le Mans meeting. With a machine complying with all the official requirements as to cylinder area and weight, he covered the distance of 168 miles in 3 hours 38 minutes 54 seconds, being at the very satisfactory average of 46 miles an hour. Very close second place was secured by Bas, in the little four-cylinder water-cooled Baby Peugeot; Ronteix came third, and Baby Peugeot fourth and fifth.

In addition to this class, provision was made for machines not exceeding the 1100 cc. cylinder capacity allowed under the cycle car definition, but having no weight limit. In this class the winner was Muraour on a four-cylinder water cooled Ronteix. His time for the 168 miles was 3 hours 37 minutes 25 seconds. Mathis, on a cycle car

built entirely on car lines, was second in 3:54:38, and Heck on a Fif, also a car type, came third.

Very few failures had to be recorded. Simon on an Automobilette, broke a rear spring when going over a bump on the road. As the result of this the car turned over and was wrecked, the driver and passenger being uninjured. Ducruzel, on the second Automobilette noticed that the wire cables of his steering gear were chafing and rather than risk an accident withdrew. This firm has now decided to employ direct steering in place of cables.

The Singer, the only English machine in the race, went out at an early stage with engine trouble. Bourbeau was held up on the first lap with three punctures. His Bedelia was run fast and regularly on the following laps, but the leaders had set such a pace that it was impossible to close up on them. A second Bedelia, a water-cooled model, was withdrawn early with a broken manifold.



Left—One of the Violet-Bogey in action. Center—Muraour on the Ronteix, in which he won the race for cycle cars of unlimited weight. Right—Noël swinging around a corner at high speed in the Noël.

Luxury Distinguishes 1914 Peerless Closed Cars

THE luxury of the closed body will be one of the important factors of the 1914 season, but combined with the luxurious furnishings are more rational features such as greater window space, more satisfactory electric lighting, roomier seats and other general conveniences.

For next year the Peerless company is building a series of limousine, berline-limousine, landaulet and coupé types on its 38, 48 and 60-horsepower, six-cylinder chassis. The limousine and landaulet illustrated herewith show the roof with a straighter effect than is used this year. European body designers having discarded the excessive dip in that portion of the roof above the driver. In all models tires are carried in the rear, leaving the runner boards entirely clear.

Sheet aluminum is the major material used in the body construction. The doors are so hung as to open practically flat against the body, yet without touching.

The interior height of the rear compartment measures 59 inches. On the limousine and landaulet the front doors are 18 inches wide and the rear 24. On the berline model the fronts are 21 and the rears 24.

Body squeaks, which are so undesirable in closed as well as open types, have been guarded against by placing strips of special canvas belting between the chassis and the body, and also extra brackets which are designed to hold the body rigidly to the channel frame members.

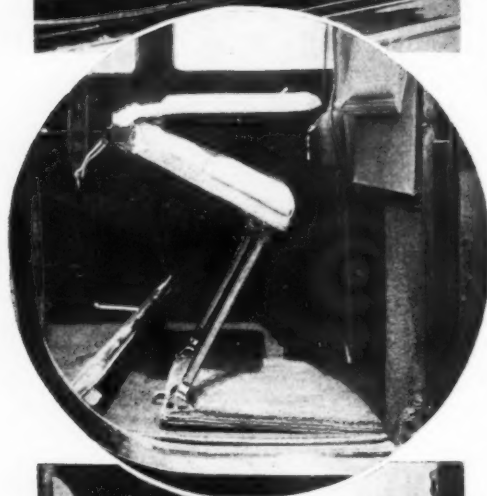
A conspicuous body characteristic is the large windows, which in reality appear larger than the measurements shown, in that all frames and casings have been eliminated by the use of the Swiss railway window glass—a heavy plate type which moves up and down in grooves.

The side and inter-compartment windows are raised and lowered by straps, and those in the side doors are raised and lowered by turning a small handle similar to that used on a safe. Turning this handle in one direction raises the window and in the other lowers it.

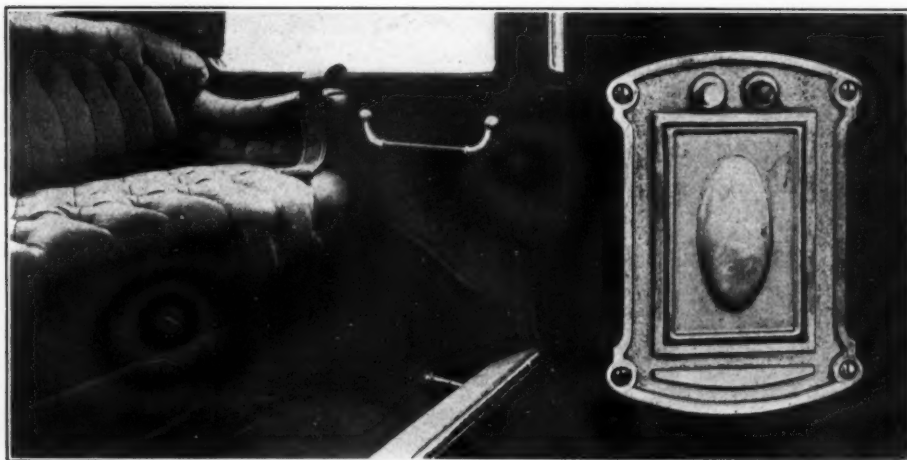
The side illustration shows the large size of the windows, those on the side measuring 35 inches front to rear; those in the door occupying practically the entire width, which is 24 inches, and those beside the driver 12 inches. In the rear is another window 31.25 inches long and 17.5 inches high. With this window space the passengers have a complete view of the street and the driver has a wide-range vision as well as a clear view of the street behind him.

Patent Auxiliary Seat a New Feature

A feature of these new Peerless bodies which greatly adds to their comfort is the patented auxiliary seat for the rear compartment. This seat, when not in use, holds and completely disappears in the inter-compartment wall in back of the front seat, leaving the rear entirely free and with nothing to indicate the presence of extra seats. The series of illustrations show how well this is accomplished. In 1 the seat is folded into the inter-compartment; in 2 it is shown in the act of being lifted



Three positions of the new patent Peerless folding seat



Interior of Peerless closed car for 1914, showing arrangement of Pullman lamp. The ornamental silver plate swings open when one of the buttons is pressed, and lights the lamp

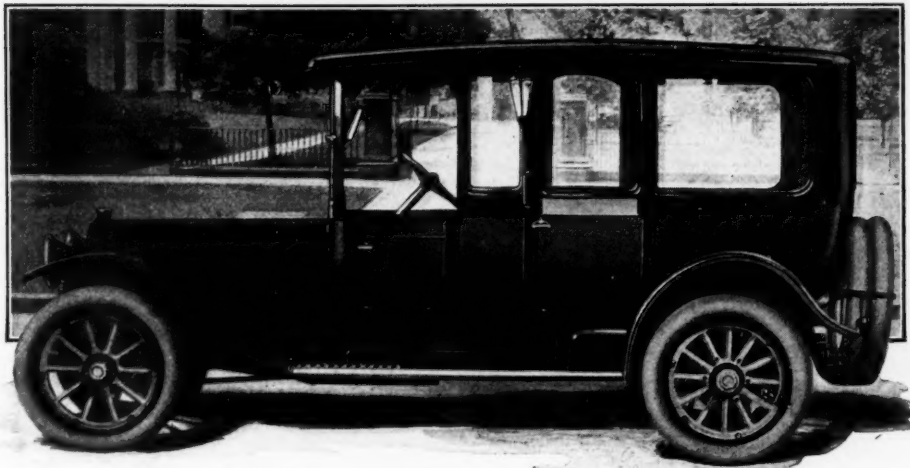
into position, and in 3 it is in position ready for use. This seat has its two supports hinged to the following door which normally is vertical and covers the opening with which the seat folds, but with the seat in use it rests flat upon the floor. The back of the seat is adjustable and may be raised or lowered to suit the convenience of the passenger.

The regular seats in both front and rear compartments are of the Turkish roll type, made with extremely deep upholstery filled with real hair.

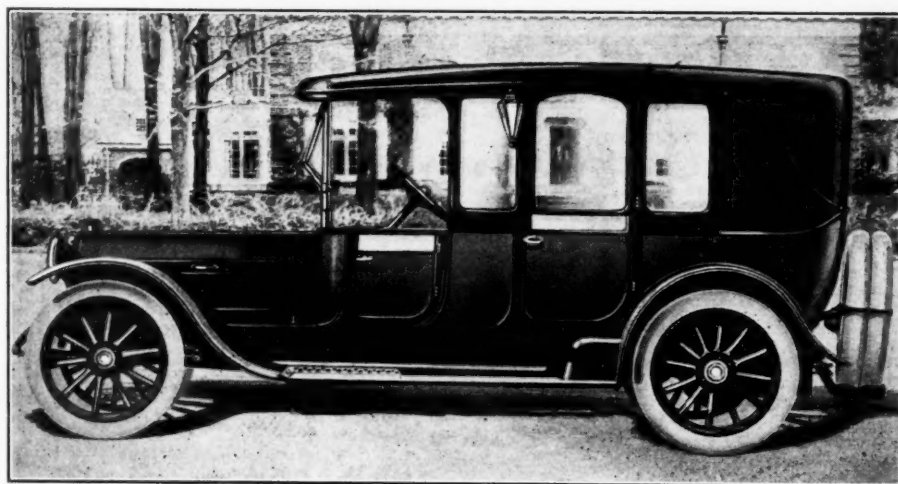
The lighting arrangements of the interior have been given careful attention, one detail being the fitting of Pullman type interior electric lights, one in each rear corner. Beneath each light are two press buttons. Touching one causes the light to turn about into the open and touching the other makes it disappear, leaving only a polished ornamental silver plate in its place.

A safety precaution in lighting consists in fitting miniature lights on the door frame just above the step, the light being automatically turned on.

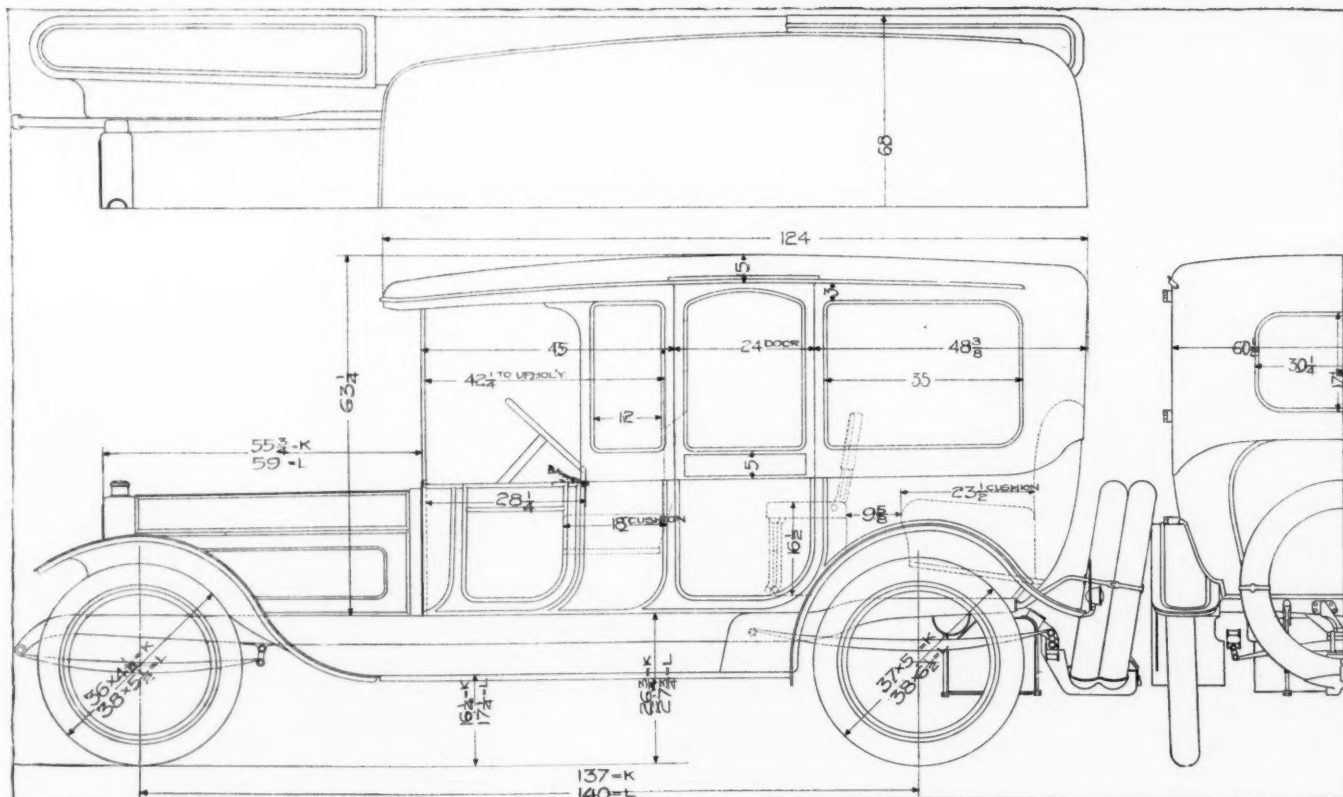
The standard colors on these doors are: Panels, thistle green; initial door panel, light thistle green; wheels and spokes, light thistle green; with the radiator shell, bonnet, fenders, aprons and shields black enamel. Black paint is used on the front of the dash, bonnet rail, wheel hubs, felloes, rims and running gear. Hub caps, lamp rims, steering column, windshield and exterior trimmings are nickel-plated. All body stripings are in gold leaf.



Peerless limousine for 1914, showing mirror and rear tire carrier



Landaulet body design on the 1914 Peerless, showing new window back of door



Working drawing, giving dimensions of the Peerless 1914 limousine

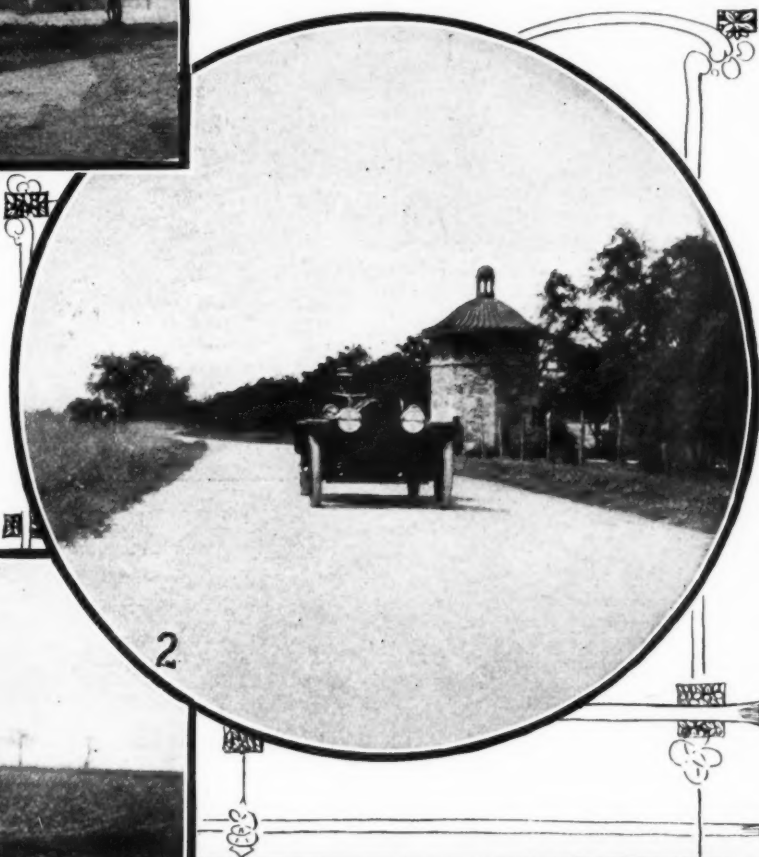
Picturesque Southland Invites Tourists



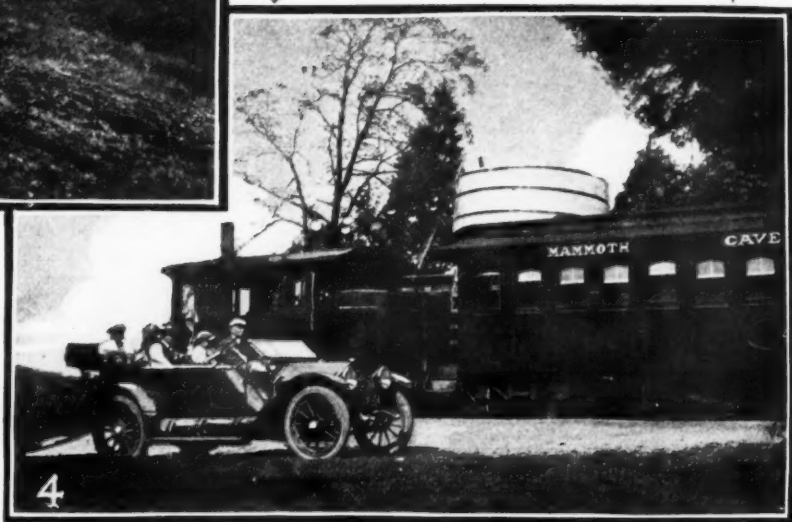
1—Near San Antonio, Tex. A Marion Bobcat exploring in the mission country. The illustration shows one of the few remaining missions, which was built hundreds of years ago. It is indeed a rare treat to tour down into this part of the country and go through these old buildings. The roads are in fair condition and the weather is always sublime, affording ideal touring conditions in a most picturesque country. This country is called a level country, but in reality slopes to the southeast at the rate of 6 feet to the mile. It is also known as a prairie country.

2—This road near San Antonio might easily be considered in New Jersey or Massachusetts. It runs for miles around the city and is one of the most beautiful automobile boulevards in the country.

3—Where automobile going is not a recreation. During the spring thaws in northern Indiana automobiles usually have a long rest. Few motorists try to plow through the mud roads. The picture shows Secretary Gilbreath of the Hoosier Motor Club looking in dismay at the road over which he has been plowing in a Marion 48-A. In the summer this is a beautiful dirt highway.



4—At the recent Good Roads Convention at Mammoth Cave, Ky., the Hoosier Motor Club officials who toured to this famous place found an interesting contrast of the old and new transportation methods. The little train which runs from Mammoth Cave to Glasgow Junction seems of the most primitive type, standing beside the 1913 touring car, in which the Indianapolis motorists made the trip. In the car are W. S. Gilbreath, secretary of the Hoosier Motor Club; F. I. Willis, ex-president of the club; and Hon. C. A. Bookwalter, club president.



New Kissel Kar Building for Chicago

THE Kissel Kar building at Chicago is a three-story structure, incorporating the latest building features and occupying a site 90 by 120 feet. It is located at the corner of Wabash avenue and Twenty-sixth street, one block from Michigan avenue. The accompanying exterior view, Fig. 1, gives a clear idea of the ample lighting facilities afforded by the large window area.

The salesroom, shown in Fig. 3, covers an area of 8,000 square feet and has entrances on both Wabash avenue and Twenty-sixth street. The wholesale end of the Kissel business is handled from offices in this room.

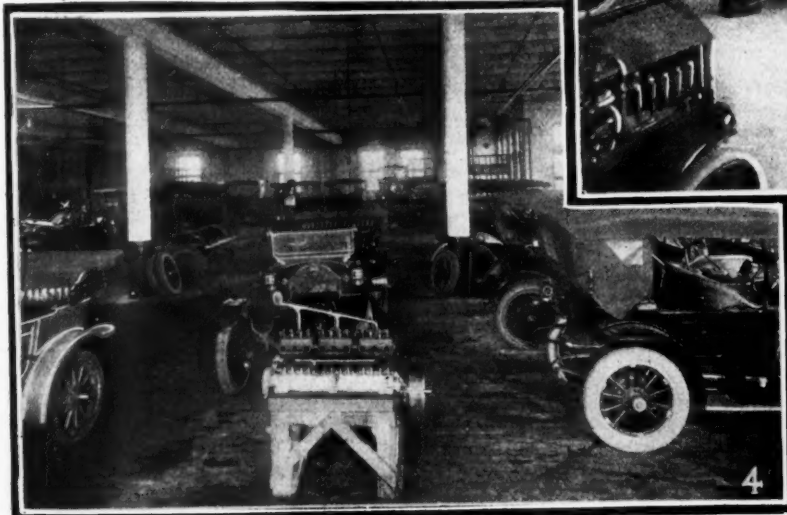
Immediately to the rear of the salesroom and taking up a similar amount of floor space is the truck garage. This garage is provided with all of



the modern improvements for the rapid handling of trucks. Each vehicle sets on its own wash-rack and has individual water and electric-light plugs.

On the second floor the front half is used as a second-hand department, while the rear portion is utilized as the passenger car garage, a view in which is shown in Fig. 4, fitted with separate wash-racks as with the truck garage. Similar divisions of the third floor are occupied in front by the paint department, as well as a storage space for new vehicles, and behind by the stockroom and shop.

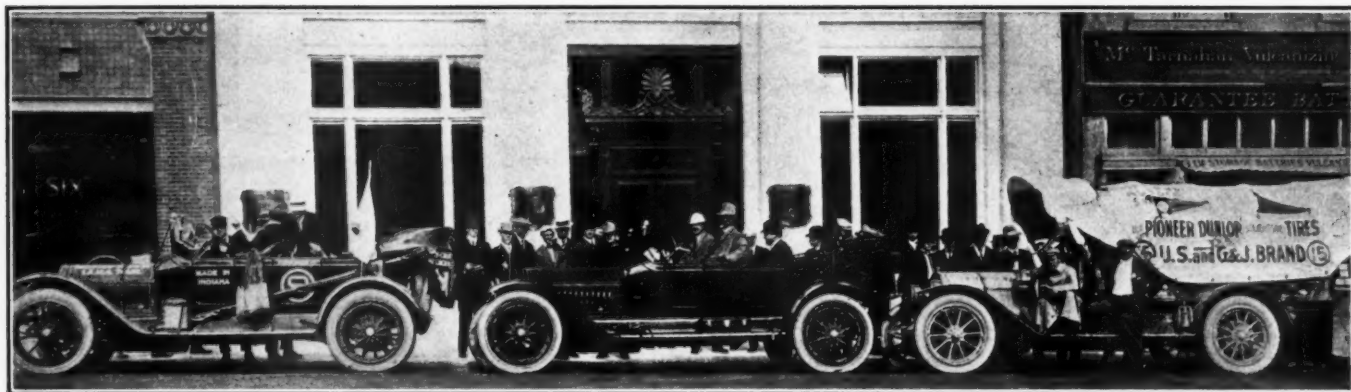
Considerable attention has been given to the arrangement of the stockroom; which occupies a floor space of 1,000 square feet. A duplicate part of every Kissel truck or car ever manufactured will be carried.



An engine testing department is installed, in which every motor after it has been overhauled will be put on a block and thoroughly tested out before placing in the car. A view showing part of the engine testing shop is given in Fig. 2.

A Westinghouse motor-driven air compressor furnishes power for air drills and rivet hammers. Air piping extends throughout the building for tire pumping and also for the cleaning of motors.

The building is equipped with a 5-ton elevator, the dimensions of which are 30 feet by 11 feet. Provision against fire is made by a complete up-to-date sprinkling system.



The three Premier cars in the Indiana-Pacific run as they arrived in San Francisco

Big Tour Had Important Business Side

Indiana-Pacific Entrants Made Things Lively by Carefully Planned Advertising

FUNDAMENTALLY, a long-distance tour such as the transcontinental motor trip of the Association of Indiana Automobile Manufacturers from Indianapolis to the Pacific coast is for the purpose of exploiting the products of the manufacturers in that association. If the tour directly or indirectly does not sell the cars of the makers who went to the expense of sending one or more cars and their crews on the trip, then from their point of view, at least, that tour was a failure. The maker who spends \$1,000 to send the cars and their crews on the run expects to reap a harvest of orders from that sowing, but he has prepared the ground beforehand and carefully tends the sprouting orders afterward. Let us see how the natural interest aroused by a 4,000-mile tour and human curiosity is worked upon to produce results on the salesbook.

Overshadowed as it was in the minds of the people of the west by the prospect of a national highway, the performance of the cars which opened the road across desert and mountain was not lost sight of. It is probable that the interest in the cars was more widespread if somewhat divided, due to their connection with a doubly-concrete, good-roads movement. The combination of interest in the improved highway from the east and the motor cars brought the people out by scores at every crossroads, by the hundreds at every hamlet and by the thousands at every city. It only remained for the manufacturer to concentrate the interest of these people on his particular car.

Many Advertising Novelties

Two distinct business methods were employed, few of the makers devoting themselves exclusively to either. One method was by advertising and publicity in the local newspapers, both previously to the trip and for a day or two after arrival. The other method was the more immediate and probably more prolific in the number of inquiries, though it is doubtful if any more sales result. This was by the employment of some novelty about the car which will attract attention to it or by some occupant of the car whom the public wished to see and whose presence shed a reflected glory upon the vehicle.

Of all the cars in the run, the two Hendersons probably received the most attention from what might be termed circus parade tactics. Whether or not it was intentional, these cars caught the eye of the multitude first and held it longest; whether it will mean anything in the way of sales remains to be seen.

The fact that R. P. Henderson, the maker of the car, was its driver was in itself enough to make the larger one conspicuous, but a more potent magnet for the eye was W. E. Gilbraith, perched on the back of a rear seat, head covered with a red

bandanna, and waving in either hand a war-pole decorated with a collection of flags, pennants and ribbons garnered from every town in the eight states the tour passed. On entering a town, Gilbraith would assume a pose suggestive of a combination of the "Spirit of '76" and "Ajax Defying the Lightning," a grandstand play that made him and the car the cynosure of all eyes.

Ray Harroun, the speedway driver, played on the curiosity of the public in a less spectacular though no less effective manner. Speed fans gazed at the former international champion with adoring eyes. Harroun's selection of wire wheels and monster tires may have been prompted only by engineering considerations, but the comment they aroused was an advertising asset when it comes to the sale of his kerosene carbureter. This in itself was the chief item of interest in connection with the smaller Henderson. The fact that a car had more than half-way crossed the continent on kerosene made it the center of a buzzing swarm of motor bees at every stop.

Haynes cars basked in a reflected effulgence of fame from the presence of Elwood Haynes, upon whom the people looked as the father of the American motor car. Nor did the Haynes publicity man allow slip any opportunity to get Haynes in the public eye. The Haynes publicity was the most insidious of any. A luncheon given by the commercial club of some city would have Haynes soup on the menu and the next banquet would provide Haynes pudding.

Apperson jackrabbits were features of interest to the public and the brilliant red of their bodies made them conspicuous. A judicious distribution of tiepins in the shape of jackrabbits proved good general publicity.

Owing to the fact that W. McKay White was chairman of the tour, Marion cars received much vicarious glory and White saw to it that they got their share.

The Pathfinder bore large brass plates giving the records of its three previous transcontinental tours, and until Denver was reached, the fact that it was running with a sealed bonnet drew attention.

Governors Accompanied Tour

Pilot's automatic headlights aroused interest and made a fine talking point.

The two famous pilots, Ray McNamara and A. L. Westgard, made the Premiers objects of interest.

The Marmon profited by the presence of Carl Fisher and his guest, the governor of whichever state the tour was negotiating.

The little Empire, as the smallest car on the tour, was the

recipient of much attention. This was augmented by the appearance of the tires, none of which was changed until within the confines of California.

All the foregoing is the more interesting but incidental publicity. The real work of the publicity man began weeks before the tour, when he made up his lists of papers in the towns through which the tour was to pass, got up his advance story and cuts and mats and sent them to the local papers. Then the advertising which was to appear during the week the tour was in the state must be gotten out. Letters to the local branch managers suggesting that they get their prospective customers out to see the cars on the run and meet the men from the factory are needed. During the progress of the run night letters back to the factory each evening outlining the day's run from the car's point of view. These telegrams form the groundwork for publicity in the papers of the sections to be visited.

Prospects Saw Cars in Tour

Marion publicity and advertising on the tour was handled much this way. All the way across the eight states local papers had material for stories and illustrations of the Marion tourists for release on the day before the cars arrived. Agents had their prospects in to see the cars. According to Mr. White, the cost of the tour advertising and the preparation of the publicity amounted to about \$350. As for the cost of the tour, he calculated it required a total of \$1,050 to take the two cars and their crew of six men from Indianapolis to Los Angeles and back by train.

A feature of McFarlan publicity was the distribution of pen-nants, and if the number passed out is any criterion, McFarlan should be a household word adorning every home between the Pacific and the Wabash. The liveliest part of the McFarlan campaign was centered in California, comparatively little attention being paid to the other western states.

The Empire publicity was handled in almost the same way as the Marion. Each evening a story was sent back to the factory to be mailed out to a list of publishers and released two or three days before the tour arrived. One hundred and fifty dollars was the cost of this, as estimated by Harlow Hyde, and consisted chiefly of the preparation of photographs and mats for illustration and the postage.

Apperson publicity was handled in the same way and the cost was about the same so far as the publicity was concerned. A war of advertising between the Haynes and Apperson interests as to who was the American Gottlieb Daimler almost carried some of the local papers off their feet. Hair splitting almost led to hair pulling among the rival crews. The Haynes people distributed samples of their factory organ, "The Pioneer," a readable sheet in an attractive cover that caused it to be carried home. The Hendersons distributed a folder entitled "Across the Continent on Kerosene," booming simultaneously the car-bureter and the car.

Costs Were Hard to Figure

Just what the results of the tour will be to the individual makers never will be known in dollars and cents. Certain it is that there has been an intense interest stimulated in the particular cars that made the run. Possibly American cars stand the best show to reap orders from those whose interest was excited by the way the two underslung came through. That is by having a factory man on the ground after the cars leave who works up the prospects elicited by the tour. D. S. Menasco traveled by train and stopped at only the larger cities. He arrived long enough before the tour did to have arranged for the newspaper publicity and advertising and stayed long enough afterward to assist the local salesman in cashing on the interest aroused by the tour.

In every city passed through, there was a long line of cars filled with the most interested critics who scanned the performance of each car with an impartial eye and whose interest was especially keen because of the fact that they were prospective buyers.

Tires Lasted 3,500 Miles

Fourteen Casings Were Changed On the Twelve Hoosier Cars

MOTORISTS contemplating cross-country tours of 3,000 or 4,000 miles generally are at a loss to determine what allowances or preparations should be made for tire troubles. The experiences of the tourists on the Indiana tour to the Pacific coast, which ended at Los Angeles, Cal., August 4, will give a line on what is to be expected in the way of tire changes and tire troubles in a transcontinental run.

Reports on tire troubles were received from twelve of the eighteen cars in the tour when they had reached San Francisco after a run of 3,500 miles. The route covered all types of roads and practically all conditions of travel, including the prairies of the Middle West, three deserts and four complete mountain systems. The hot sands of the desert and the sharp stones of the mountain climbs shortened tire life, but on the whole better tire service was obtained than was to be expected.

Fourteen casings were changed on the twelve cars that reported, an average of slightly over one tire per car. This means that even under these adverse conditions the expected life of 3,500 miles was obtained from three tires of each car.

Of all the cars in the tour the little Empire got the best tire service, arriving at the coast with Indianapolis air in three of its tires. This car ran as far as Sacramento, Cal., without a tire change.

The two Apperson cars approached this record, arriving in San Francisco with Indiana air in three tires on one car and in two forward tires on the other. The latter sustained three punctures, but reached the coast with the five casings with which it started.

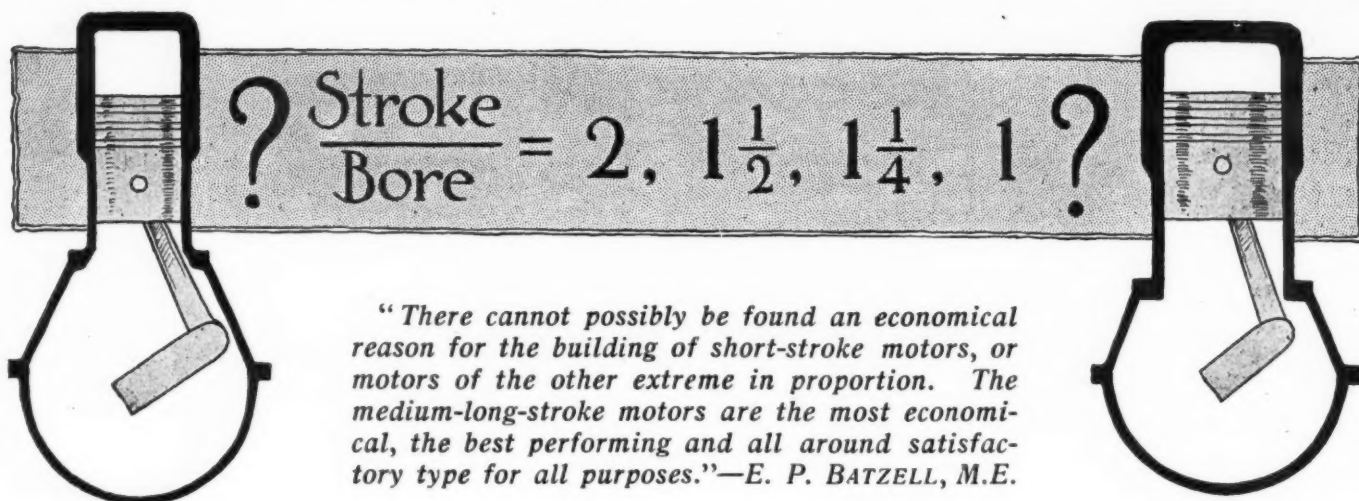
Harroun's Henderson also arrived with its original equipment, although, on account of five punctures, only one tire finished with Indianapolis air. Harroun started with one spare casing and interchanged, putting on the spare when a puncture occurred. He had demountable wire wheels and simply interchanged wheels in case of a puncture. The tires used were exceptionally large in cross section, being 34 by 6 inches in size, and the air pressure was carried at a very low figure, 30 pounds in front and 35 in the rear. Harroun had no blowouts and all five tires were in good condition when the coast was reached.

The two Marion cars got through with little tire trouble, the roadster arriving at San Francisco with Indianapolis air in the two forward tires, although the rear ones were changed. No blowouts were reported, and but three punctures were sustained. The touring car reached the coast with Hoosier atmosphere in one of the front tires. Two punctures had been sustained on the trip and two casings were changed, although no blowouts were reported.

One of the Haynes cars arrived with Indiana air in one tire and was shod with three of the original casings. There had been no blowouts, but three punctures had been sustained. The other Haynes had an equally good report.

McNamara's Premier changed only one casing and had only two punctures, reaching the Pacific with Indiana air in two tires. The Premier truck got as far as Salt Lake City without losing Indiana air from any of its tires, but at this point the two rear tires were changed as a matter of precaution. The only tire trouble sustained by the truck was one puncture.

The McFarlan came through with only three tire changes, the original inflation holding in one of the front tires throughout the trip to the coast. As an example of the effect of the brakes on tire wear, may be cited the case of the Pathfinder. This car made an excellent showing, except on one wheel. It reached the coast with three of the original tires. But on one of the rear wheels four tire changes were necessary, due to the wear occasioned by a brake equalizer that was out of condition.



Most Efficient Stroke-Bore Ratio

Wear on Motor Varies in Long and Short-Stroke Motors

By E. P. Batzell, M.E.—Part III

THIS is the third of a series of articles by E. P. Batzell in which he discusses the ramifications of the stroke-bore ratio. In this part he points out how the different ratios affect the wear on the pistons, cylinders and bearings.

The wear in the main crankshaft and in the connecting rod bearings generally would be in a direct proportion to the specific pressure existing there and to the surface velocity of the bearings, because the total acquired bearing play is to be considered in this case without reference to whether this play has been occasioned in a long or in a short bearing. To some extent the permissible amount of play in measures of length could vary with the bearing diameter, but within the limits of these diameters encountered in the average automobile practice, this variation should be negligibly small.

The constructive execution in practice of the long and short-stroke motors is easily carried out, so that their bearings work under approximately equal specific pressure, but the incorporation of some special requirements often results in somewhat lower pressures in the bearings of the long-stroke motors. Recollecting the difference in the bearing surface velocities in the compared motors, when their bearing losses were figured, one arrives to the conclusion that the smaller specific bearing pressure of the long-stroke motor is combined with a much lower velocity of the bearing pin in its shell. Consequently, this type of motor is giving a certain service with less chance for a rapid wear of its bearings.

Light Piston Quiet

The matter is different in regard to the piston wear of the long-stroke motors, because there is a marked tendency to reduce their piston length. The shorter and consequently lighter piston is essential for a more quiet motor running at high speed, cutting down the inertia of the reciprocating parts, which otherwise would increase very rapidly with the lengthening of the stroke. Although these shorter pistons are used in motors of a smaller bore, nevertheless they reveal a higher specific surface pressure against the cylinder walls, even with the assumption of an equal ratio of connecting rod length to the motor stroke in the motors under

comparison. This brings with it a noticeable difference in the effects of wear in the cylinders and pistons of the long and short-stroke motors, even though their friction work between these parts has been found not to be influenced by the stroke-to-bore ratio.

The relatively short piston of the long-stroke motor, working with a higher specific pressure and upon a longer course, will be the part most affected by the wear. The cylinder walls being the other recipient of the same amount of friction work in reality wear much less than the piston, because should the parts be of the same material, the same amount of wear is distributed upon the whole length of the cylinder wall, which offers a much greater surface than the piston. It should be mentioned, that this distribution of the wear upon the cylinder walls is not quite even, being the most in the part near the middle of the piston course for obvious reasons.

Piston Wear a Factor

The above point concerning the rate of piston-and-cylinder wear in the long-stroke motors must be kept in mind in connection with the selection of piston and cylinder material when adopting a motor of this type; whereas in the short-stroke motors it has been an established practice to use the same grade of material in both the pistons and cylinders. The piston of the long-stroke type requires a material of a somewhat greater wear-resisting ability than the cylinders. In the short-stroke motor with a comparatively long piston the wear is pretty equally distributed between the latter and the cylinder, their available wear-resisting surfaces being nearly alike. Practice has confirmed the above, which can be seen in the experience of those who changed their motors to a longer stroke without changing the piston material to a harder, better wearing one at the same time.

The explained superiority of the long-stroke motor in respect to its bearing wear thus is being offset by the more rapid wear in the piston. However one cannot state that the former advantage is fully offset by the discomfort created by the latter circumstance, the nature of the noticeable effects from these two sources of wear being different in character. The life of the piston when it is well made, of the proper material and follows proportions established by good practice extends over several seasons, without making great discomfort noticeable. On the other hand, the crankshaft and connecting rod bearings seldom stand more than a season's use, generally requiring attention in less time

than that. It would appear to be much more desirable to possess an engine which would serve through a season without requiring that its bearings be looked after and tightened, than to be obliged to do the latter amid the season for the advantage of having an engine, in which the life of the piston may be extended over 1 or 2 years more, than in the first type of engine with more reliable bearings. The annoyance created by the extra work on the motor bearings could not be redeemed by the fact, that the piston will last, for instance, 4 years instead of 3.

Of late it has been a common occurrence that the stroke of an engine has been lengthened without changing its bore. The comparison of the mechanical efficiency of such two engines also will demonstrate a marked advantage of the second, the long-stroke type over the short-stroke one. For this comparison it is best to bring all figures pertaining to the engine performance down to the same piston speed, which consequently could be assumed also to be the moment of an equal power development inside the cylinders (indicated power). The short-stroke engine would have a greater friction loss in proportion to the power in its crankshaft and connecting rod bearings, because even with bearings of equal diameter in both motors, it is called upon to run at higher revolutions per minute to give the same piston speed as the longer-stroke type, consequently the velocity at its bearing surfaces is greater. The bearing frictions in the two motors will compare as their bearing velocities.

Frictional Losses Equal

The piston and the piston ring friction loss is equal in both motors because they depend merely on the piston travel per unit of time, all other items being alike.

The power loss in the valve mechanism also is greater in the short-stroke motor, the number of times the valves must be lifted here in proportion to the piston travel per minute being greater. Of course, one could be inclined to believe, that with the difference of piston displacement existing in the two motors, the valve lift could be made approximately proportional to their displacement, the valve diameters remaining the same as the motors are of equal bore. Such a proportioning of the valve opening would render it much less efficient in the short-stroke motor, because the losses suffered by the energy of a gas flow are greater, when the opening represents an orifice of comparatively great length and only a very small height.

Fig. 4 shows the sections of the maximum valve openings with the valve lifts differing as the motor strokes, the ratio of which has been assumed to be 2 to 1. Whereas the first opening has a certain ratio of its periphery to its area, the second, the narrower opening, has practically the same periphery for an area only one-half of the first. The gas flow energy sustains losses increasing with the periphery of the opening passed.

To equalize both motors in respect to their volumetric filling, rate of cylinder filling by fresh intake gases, the short-stroke one must be equipped with a valve mechanism with a somewhat greater valve lift than follows from the direct proportion of the two motor strokes. Consequently also a greater proportion of power will be spent there on the work of lifting the valves.

The biggest item increasing the work of valve operation in the short-stroke motor will become noticeable in the lifting of the exhaust valves against the pressure in the cylinders. This work is increasing in proportion to the pressure inside the cylinder, the valve diameter and the frequency of the valve opening in a unit of time. The first two factors being nearly alike, the greater revolutions per minute of the short-stroke motor for the same power development as by the long-stroke one renders the work absorbed by the lifting of the exhaust valve so much greater as the revolutions per minute are.

The above brief reference will enable one to see readily the advantages in matters of mechanical efficiency of the engine with a lengthened stroke over one with a short stroke, disregarding even additional facts of its superiority.

Thermal Loss Distributed

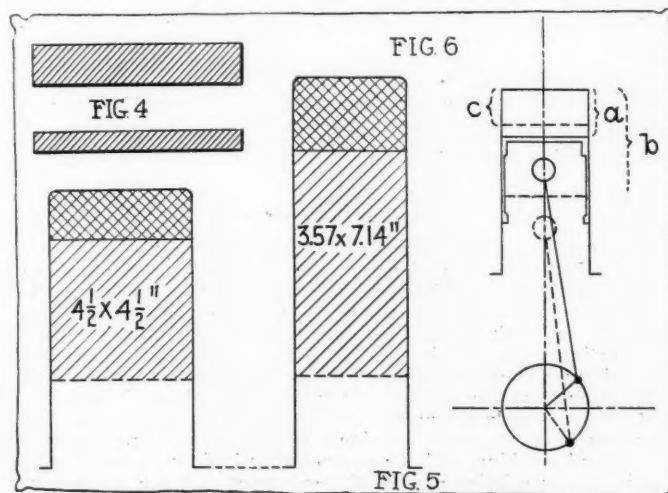
The treatment of the thermal losses in the long and short-stroke motors involves a little more complication than was found in the comparison of their mechanical losses. The desired results and answers upon some points can be obtained only following a more or less scientific way of discussion, for instance as this is carried out in the theoretical appendix to these articles. Further, the matter is rendered more complicated by the difference existing between the various cylinder shapes of motors, the location of their valves, intensity of cooling, etc.

The simplest way to obtain some results adequate for a practicable study of this subject could be met by selecting for this study of the simplest shape for the cylinder, namely a plain cylinder without any pockets, which closely approaches the conditions actually found in the motor with valves located in the head. The assumed cylinder will differ from the one of the latter motor type in that its diameter is even throughout the length including that of the proposed combustion chamber, and the two end surfaces of the cylinder are flat.

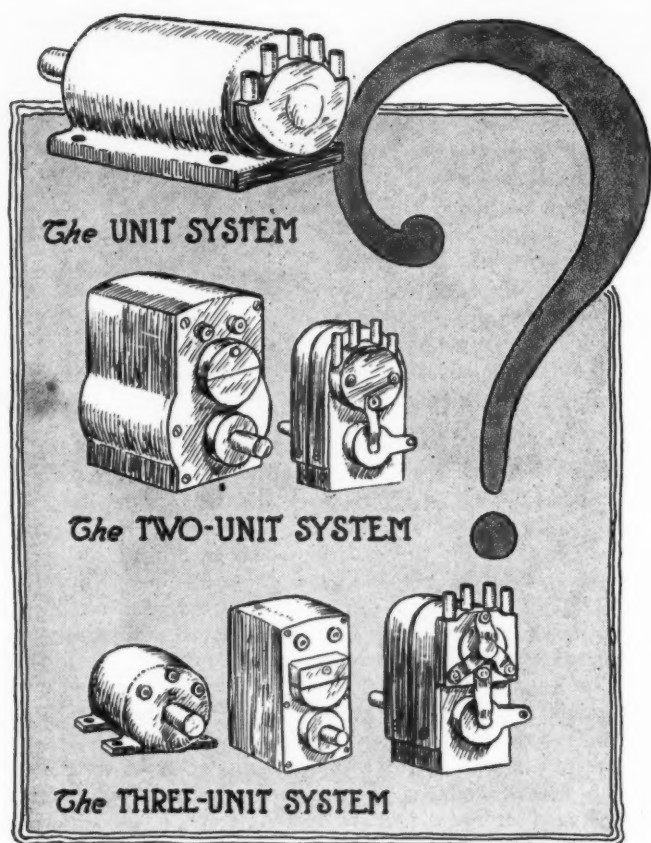
Generally speaking, the thermal losses in motors are proportional to the cylinder surface which comes in contact with the hot gases and the cooling medium, to the time during which each element of this surface is exposed to the gas heat and to the difference in temperature between this element of surface and the hot gases.

It will be understood that the thermal losses are not evenly distributed over the whole of the cylinder surface, because the length of time during which a certain part of this surface is exposed to the gases varies with the motion of the piston. Referring to Fig. 5 the cylinder surface corresponding to the combustion chamber only and occupying a length "c" is exposed to the heat of the gases and to the cooling from outside during the whole time, regardless of the piston location. The surface of a length "a" is exposed to this heating and respectively cooling for a longer duration, than the surface of the length "b", the latter part of which becomes exposed by the piston only at a later phase of its stroke. Consequently even under otherwise equal conditions the surface of a length "c", respectively "a" may carry away more heat than the greater surface "b", if the greater time of their exposure more than offsets the difference in the amount of surface exposed. This is more likely so par-

(Continued on page 331)



Diagrammatic view of variations in cylinder wall area



The Six Questions

1. Which will be the eventual system, namely (a) Unit system in which starting, lighting and ignition are combined; (b) two-unit system in which starting and lighting are combined with ignition separate; (c) three-unit system in which ignition, starting and lighting are separate?

2. Respective methods of coupling starting motors with the gasoline motor?

3. Possibilities of weight reduction in starting systems?

4. Increased accessibility of the battery for starting and lighting purposes and if excessive initial draw from the battery is injurious?

5. Positive locking means whereby tampering by outsiders cannot lead to shorting and discharging of batteries?

6. Movement to discourage senseless demonstrations of starting motors in which they are used to propel the car for a short distance?

Editor's Note

Readers of THE AUTOMOBILE who are owners and operators of cars are invited to participate in the present discussion on the relative merits of combined starting, lighting and ignition units.

The three systems are best described as the unit, the two-unit and the three-unit types. In the unit type the electric motor for starting, the electric generator for battery charging, and the ignition system are in one. In the two-unit system the battery dynamo and the starting motor may be combined in one machine with a single armature. In the three-unit system there is a starting motor as one machine, the battery charging dynamo is a second machine, and the magneto for ignition is the third.

It is on the relative merits of these types that this discussion hinges. Owners who have had practical experience with them should be able to give points of much value.

Engineers Disagree On Starter Units

Part IV

Chief of the Rushmore Dynamo
Works Has No Faith in
Single Current Generator

Jones Engineers Believe That Gear
Reduction Factor Influences Choice of
Single or Double Unit System

PLAINFIELD, N. J.—Editor THE AUTOMOBILE: The addition of electric lighting and starting to the car equipment has been so recent that most installations still bear evidence, in the cluttered-up appearance of the powerplant, of the haste with which the builders have attempted to meet the popular demand and it is but natural that many should look to the combination of the lighting, starting and ignition systems in a single unit as a possible solution of the problem, hoping thereby to reduce the complication and at the same time secure the simple and clean-cut appearance so much desired.

Whether or not it may be advantageous to combine the lighting and starting in a single unit, I consider the so-called one-unit system an absurdity, for there can be no true electrical combination of the high-tension ignition system with either the lighting or the starting apparatus, and the so-called combinations that have appeared have been mere mechanical aggregations in which the contact maker and high-tension distributor of the common jump-spark coil have been hooked onto the end of the dynamo shaft to secure the required mechanical movement.

No one would think of combining the ignition equipment with the water pump or the radiator fan, yet this would be just as rational as some of the alleged combination lighting and ignition systems that have been offered.

Favors Charging Generator

From my experience of over 25 years in the designing, building and operation of dynamos and motors of nearly every variety I am convinced that the functions of generating current for the lamps and for battery charging and of generating power for starting the engine can never be satisfactorily performed by a single machine. For more than 20 years railway electricians have wrangled over the different systems of dynamo regulation and of battery charging and they are far from agreement today. The problem of dynamo control on the automobile differs from that on the railway car only in degree of speed variation and limitation of space available for regulating apparatus.

As there are now on the market several lighting generators with very satisfactory inherent regulation and thus free from the complication of slipping clutches, centrifugal governors, etc., formerly considered essential to successful operation, I believe the present discussion narrows down to the selection of the engine starting motor and the means to be employed for imparting its energy to the engine.

The electrical problems involved in the design of the engine starting motor are really of the simplest character, although a number of experienced designers, failing to fully understand the special character of the service required, have made the natural mistake of following blindly their former practice in designing motors for electric vehicles or railway service where, owing to the serious limitations imposed by temperature rise in

sustained operation, they have not been free to proportion things to secure maximum output or efficiency or the least weight and bulk. Thus we find that most of the engine starting motors on the market are of fully twice the size and weight that they need be for their actual output while their operating efficiency is much lower than is now known to be easily attainable.

The design of the starting motor is determined largely by the mechanical means selected to transmit its power to the engine crankshaft. In the case where the armature takes the place of the engine flywheel the electrical designer has no show at all, for to secure the required flywheel effect the amount of material must be greatly in excess of the requirements for the small amount of power to be developed, and it is not surprising that such machines show extremely low efficiency and demand a battery of relatively enormous size and weight, while, owing to the extremely weak field that must be used to work so large an armature at so small an output, excessive sparking at the brushes is unavoidable.

Intermediate Gears Noisy

Automobile engineers are divided as to the best means for connecting the starting motor to the engine. Owing to the excessive noise and power loss with the intermediate gears and to trouble with the ratchet and roller clutches used with most of the flywheel geared starters there is now considerable demand for a starter that will drive through the camshaft or by enclosed chain with sprocket on the forward end of the crankshaft. Where the machine serves as both generator and starter and is driven continuously, a low gear ratio, usually $2\frac{1}{2}$ to 1, is employed in order that the armature may not burst by centrifugal force at the higher engine speeds. This necessitates a large, heavy and inefficient machine requiring a battery comparable in size and weight to that demanded by the flywheel machine.

Attempts have been made to employ a high-speed motor with chain drive to the crank or camshaft by incorporating with the motor a planetary reducing gear together with the usual roller or ratchet clutch. Such an arrangement, although costly and complicated, would result in some saving in weight were it not for the excessive friction losses that are unavoidable with any commercial form of high-ratio planetary gearing. This loss in efficiency of transmission results not only in increased weight of the motor but of the battery as well.

A little consideration will show that the flywheel gear has never caused any trouble and complaints in connection with it have been due solely to the noisy makeshift contraption of intermediate gears, ratchet clutches and lever shifting mechanism that has heretofore been employed.

Just as surely as the shortest distance between two points is a straight line, so the most rational and efficient means for transmitting the power of the electric motor to the crankshaft is a pinion keyed to the armature shaft and meshing directly with the teeth on the flywheel rim. As this arrangement necessitates a gear reduction of but half that usually employed it would commonly be supposed that the motor must be made larger and heavier in proportion. The fact that our motor, although smaller and lighter than machines running at double its speed still delivers, for the same current and voltage, more actual power is due to its having been designed for engine starting only. The motor delivers directly to the flywheel rim, in actual horsepower, fully 73 per cent. of all the energy it

receives from the battery. This showing is believed to be fully one-third better than is possible with any of the other systems and, with the consequent saving in size, weight and cost of the battery, fully justifies the employment of a separate motor for starting duty.

Experience shows that the modern starting battery suffers little if any injury from the instantaneous rush of current to accelerate the flywheel. The initial current varies with different systems and with our 6-volt system seldom exceeds 150 amperes on engines up to six-cylinder 60 horsepower.

Drain on the Battery Varies

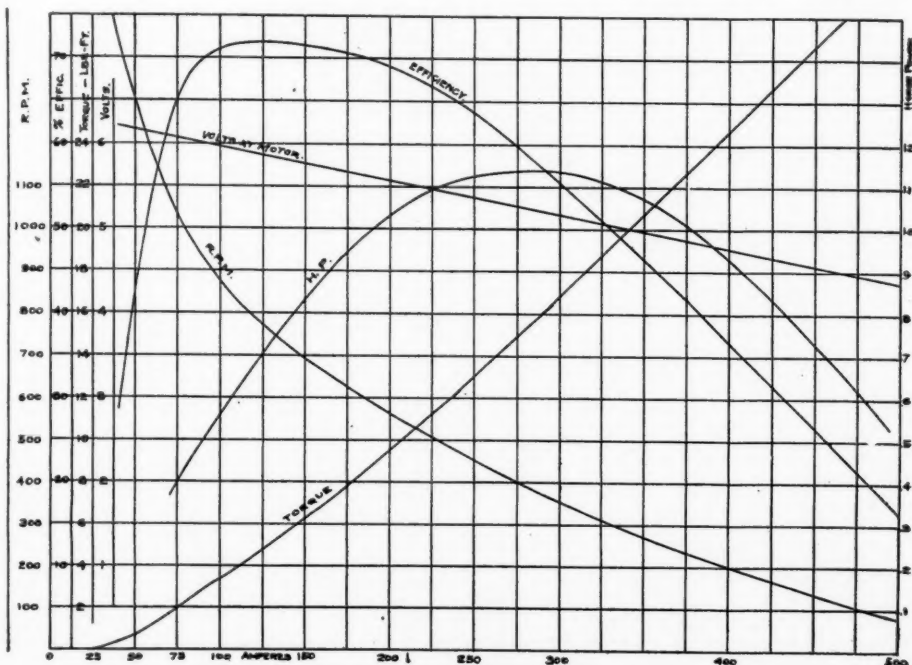
Practically speaking, the drain upon the battery is in proportion only to the total energy required to start the engine and is quite independent of the momentary rush at starting. Battery life depends chiefly upon the efficiency of the starter and the ability of the dynamo to charge at a high rate when required.

I have never heard of a battery being injured by tampering with the starter. At the worst a hostler may use the starter to move a car about the garage, our starter will pull a 4,000-pound car in high gear at a speed of several miles per hour with a current draught of but 126 amperes at 5.5 volts. A normal 120 ampere-hour starting battery will stand this load for 20 to 30 minutes, so we believe the battery will rarely suffer through such occasional abuse.

A great deal has been said about the need of gearing the starter with a high ratio to enable the motor to pull the engine over compression and to avoid stalling in very cold weather. There is no such need where the motor is properly designed to have the lowest possible internal resistance, so that its efficiency will be well sustained when taking currents of several times the normal. This is well shown by the enclosed characteristic curves of our Model B starter, which is used on engines up to six-cylinder 5 and 6. The internal resistance of the motor is but .005 ohm so that, with the battery down to but 3 volts, it will pass nearly 600 amperes and develop a torque of fully 50 pounds at 1 foot radius or, with a 1.75 inch p. d. armature pinion, a pull of fully 600 pounds at the flywheel rim.—S. W. RUSHMORE, Rushmore Dynamo Works.

No Universal System—Jones

Chicago—Editor THE AUTOMOBILE: There will never be,—at least for a considerable time to come,—any one system used universally. This is due to advantages of the different systems.



Characteristic curves of efficiency, horsepower torque, etc., of the Rushmore cranking motor

We will consider a unit in which the starting, lighting and ignition are combined. There are two reasons why this machine will not be universally used. A—It has not been proven to the satisfaction of a large number of engineers that battery ignition is equally as good as the magneto, in which the voltage increases with increase in speed. B—**The combination starting and lighting machine, in one unit, does not spin the engine with as high speed, and is not as efficient a machine as the two unit type, when the ratio of drive between the crankshaft and the starter is 1 to 1 or less.** In fact, the ratio of drive between the starter and the crankshaft controls the situation almost entirely. With a ratio of $1\frac{1}{2}$ to 1 between the crankshaft and the motor generator, it is found that the combination machine is very satisfactory. With a ratio of 2 to 1 between the motor generator and the crankshaft, the combination machine will perform as efficiently and satisfactorily as the separate unit system. It will compare favorably in cranking speed, in charging characteristics, and its weight will be less than the two separate machines used for the same purpose. In combination machine I refer to motor and generator winding on the same armature.

Where it is necessary to have a 1 to 1 drive between the crankshaft and the starter, it is possibly preferable to use an individual cranking motor, and a separate dynamo for charging the battery, and at $1\frac{1}{2}$ to 1, it is immaterial which machine is used. At 2 to 1, or higher, the weight is in favor of the combination machine.

Ratio Affects Unit Choice

It is the writer's opinion that where it is possible to connect the motor dynamo at a ratio of 2 to 1 or higher, between the crankshaft and the starter, that the system with starting and lighting in one machine is to be preferred, the ignition being separate.

Due to the fact that the engine manufacturers at present have drives running from 1 to 1 to 3 to 1, it would be impossible to adopt to the best advantage, any one of these individual systems.

Referring to the coupling of starter to the motor, the most desirable method is a direct connection of the combination two-unit machine to a shaft mounted on the motor, to the starter drive. This shaft should revolve at twice crankshaft speed.

By this method, the removal of the starter is very simple, and individual ignition, such as magneto or battery can be used if preferred, and the combination starting-lighting machine, using this drive is, in our opinion, the most efficient machine possible, considering the crank speed, torque, battery charging facilities, and wear and tear on the starter.

Referring to the reduction in weight of the system, there will be some reduction as designers improve the details of the starter. This reduction, however, will not be great, but we will consider as standard the combination machine connected at 2 to 1 on the crankshaft, which weighs somewhere between 50 and 60 pounds, and which will give the necessary cranking speed and torque for a large six-cylinder motor.

The accessibility of the battery should be given consideration. If it is not placed on the running board, it should be placed where the operator will see it occasionally, and be reminded of the fact that it requires some attention.

There is no question but what an excessive draw on the battery is injurious. Starter manufacturers no doubt have begun to realize that they must manufacture their machines more efficiently. We believe that this excessive draw on the battery will limit the cranking speed on a large engine at from 80 to 100 revolutions per minute.

Few Tamper With Starter

Referring to the necessity for locking means to prevent tampering with the starter or lamps, we do not believe that there is any real necessity for locking the apparatus. I cannot recall a case where there has been any trouble caused by outsiders tampering with the starter or lamp circuit, and as the electrical

system on the car becomes more universal, there will be less tendency to tamper with the outfit, as the novelty disappears.

We believe that the demonstration of starting motors by propelling the car will also disappear after a little, and the writer sees no real reason why the starter should not be used to pull the car, if it is so desired, providing the operator understands that he will discharge his battery by a continuation of this performance. No starter should be placed on a car that will not move the car in high gear.—E. L. JONES, Jones Electric Starter Co.

Question of Economics—Moskovics

Chicago—Editor THE AUTOMOBILE: The matter of combining ignition with the starting and lighting outfit, to my mind, resolves itself to one of economics, not of mechanics.

The functions and characteristics of battery ignition are so different than those of magneto ignition, that there hardly seems room for argument on that point. Viewing the subject in a very elementary manner, the development of a high-speed gasoline internal combustion engine, with the consequent high piston speeds, demands for highest efficiency that form of ignition which, we will say, "follows the piston speed."

In other words, as the piston speed increases, so should the voltage of the ignition rise. With magneto ignition, the primary voltage rises directly with the speed of the engine, and as the primary voltage increases, spark intensity naturally increases with it, therefore overcoming to a greater extent, the increased initial pressures, and combustion conditions created by the higher piston speeds.

Another important point in this controversy that I have not seen touched upon as yet, is the vastly different spark characteristics obtained between what is commonly termed the "high-tension magneto," or the magneto in which the secondary winding revolves in the magnetic circuit, and battery ignition.

This characteristic, which is called "the arc flame" or "arcing spark," cannot be simulated by any battery ignition, because this fuse or arc is a secondary discharge due entirely to the fact that the high-tension winding is rotated in the magnetic circuit, and among magneto designers is commonly termed the "follow-up spark," meaning a second spark which follows the first spark, which is due to the break in the armature from the pole pieces. Practically every high-grade car in the country is now equipped with this form of ignition, and there is but very little doubt of the superiority of it in the matter of hot and effective ignition.

Speed Affects Ignition

The fact that motor speed directly affects magneto ignition is best illustrated by the set spark where the absence of the effect of advance is compensated for by the result of increased magneto speed directly as engine speed increases.

When a variable voltage battery ignition is brought out, and when the electrical characteristics of the high-tension magneto are approached, then will there be some slight ground to discuss the relative merits of battery versus magneto ignition.—F. E. MOSKOVICS, Secretary, Jones Electric Starter Co.

THE ELEMENTS of a starter are a source of energy, a means of applying the energy to the rotation of the crankshaft, a means of renewing the energy source, and the control apparatus, and no new or little understood principles are involved either in these elements or in their combination. The success of a starter lies in the ability of the designer to determine and to provide for the contingencies of operation under good as well as under adverse conditions. The first essential is a sufficiently rapid and positive rotation of the crankshaft to insure the operation of the engine auxiliaries, even under the influence of low temperatures, poor fuel, dirt, or misadjustment. To be practical, the apparatus should be automatic in action, in order that the source of energy may be renewed without demands on the attention of the driver.

Challenges Lighting Equipments to Tests

Wants Practical Road Demonstrations

INDIANAPOLIS, IND.—Editor THE AUTOMOBILE:—We note that Benjamin F. Bailey, of the Bailey Electric Co., is not inclined to believe that 10 per cent of the power and fuel in an electrically lighted car is consumed in operating the dynamo. His contribution, page 191, July 31 of THE AUTOMOBILE, indicates that this whole subject admits of considerable discussion.

The trouble with Mr Bailey's method of testing the proposition of miles per gallon is that he does it with a lead pencil. The testing can be done more accurately with an automobile.

It is one thing to test a dynamo with instruments in a laboratory. But when you place that dynamo in an automobile and drive it with a gasoline motor which is already propelling the car itself, theory is quite apt to be upset.

The chart of curves which Mr Bailey prepared does not make the matter quite as clear as might be desired. His curves present several matters which are of interest. For instance, I think any one who is thoroughly familiar with the merits of battery ignition and magneto ignition could suggest a few other curves which might very properly be subtracted from his curve which shows the power needed to drive magneto.

We have recently tested several lighting systems on cars on the Indianapolis speedway.

So let us make this proposition: If Mr Bailey knows of any car in Indianapolis or vicinity which is equipped with his system, we invite him to bring it to the Indianapolis motor speedway, where the power and fuel consumption can receive a practical road test under like conditions of barometer, thermometer, carbureter adjustment, position of spark, passenger load, and rate of speed.

This same proposition is open to any other manufacturer of electric lighting equipment. We shall be glad to furnish the

gasoline and any necessary mechanical help, and the only recompense we shall ask for our trouble will be a copy of the report of the test to which both the electrical manufacturer and ourselves shall certify in writing.

R. H. COOMBS,
Prest-o-lite Co. Inc.

Overland Features for 1914

TOLEDO, O.—Editor THE AUTOMOBILE:—To supplement the description published in THE AUTOMOBILE August 14 on the Overland 1914 cars would add the following:

1—The Hyatt bearings used in the rear axle are the short series.

2—The weight saved by using the pressed steel base for the crankcase amounts to about 4 pounds.

3—The type of oil pump used on the new motor is a gear design driven from the camshaft.

4—The main bearing diameter of the crankshaft is 1.5 inches.

5—The motor is suspended at three points, two of the points are at the rear of the motor and the third is at the forward end.

6—The starting motor will crank the engine under normal conditions at a crankshaft speed of 125 revolutions per minute.

7—Gear reductions are low, 2.37 to 1 intermediate 1.55 to 1 high 1 to 1 with 3.5 to 1 rear axle reduction on the roadster and coupe, and 3.75 to 1 reduction on the touring car.

8—Connecting rod bolts have been changed from carbon to alloy steel. All electrically welded parts have been changed from Bessemer to open-hearth steel. Crankshaft, propeller shaft coupling, etc., have been changed to a different carbon.

C. S. JAMESON,
Sales Manager, Dep. A, Willys-Overland Co.

Efficient Stroke-Bore Ratio

(Continued from page 327)

ticularly for the surface of the explosion chamber and the adjacent parts, because of the much greater temperature difference between the gases and the walls, than there is at the later parts of the motor stroke. It is, therefore, impossible to judge the heat losses of a motor by merely considering the whole or a part of its cylinder surface as being subject to the cooling under otherwise even conditions. The elapsing of the time duration in connection with the exposure to gas cooling of every surface element has to be taken into consideration, for more or less accurate results.

This problem is still more complicated on account of the variation of the piston velocity during its stroke. Nevertheless the comparison of the different motor types as aimed in this article fully warrants one to introduce the necessary complication into the calculations, because otherwise one could not relay that the obtained results are very nearly actual facts.

As a general rule the fact remains, that the heat losses impairing the motor efficiency are smallest when the ratio of the surface to the cylinder volume enclosed by this surface is the smallest.

It would follow, that from the start it is essential to know which cylinder proportions afford the smallest wall surface for a given total cylinder volume.

In Fig. 6 are shown sections made to scale through two cylinders one of the $4\frac{1}{2}$ by $4\frac{1}{2}$ -inch and the other of the

3.57 by 7.14-inch motors. The lower dotted lines indicate the upper surface of the piston head when the piston is in its lowest position. It is difficult to realize from mere appearance, which of the two cylinders possesses the smaller surface, their volumes being equal, counting in also the surface of the cylinder head on an even basis with the rest of the surface. This can be done without introducing a marked inaccuracy into the final results, because the piston head cools the cylinder gases almost as much as the cylinder walls. Of course, the temperature difference between the gases and the actual cylinder walls is somewhat greater than between the gases and the piston head, the latter being hotter than the walls, however, the proportion of the possible error is very slight, because the proportion of the assumed error in the temperature difference is slight also.

The total temperature difference between the gases and the cylinder walls near the middle of the piston stroke may amount to about 1,600 degrees F., whereas the same difference between the gases and the piston head may reach only 1,400 degrees F. The error of about 12 per cent. being applied only to a small portion of the whole cooled surface will make our possible mistake negligible. The piston does not show a temperature much higher than the cylinder walls, being well cooled through contact with the latter and through the created air draft inside the crankcase, which carries away much heat penetrating the comparatively thin metal of the piston dome.

(To be continued)

Laying Out the Service Building

Proposed Method of Arranging Various Departments in a Big Station in Large Car District

EQUIPPING a service department, in the widest sense of the word, comprises three steps, namely, the selection of location, the layout and the design and construction of the building itself. Each of these steps is of grave importance, and so in proportion to the largeness of the service department to be established and the amount of business to be carried on in it. In the selection of a property location for a service department, the first thing to consider is a place well accessible for all automobile owners to be served in a given territory, and the second and equally important point is the selection, among a number of best-suited points, of the lowest priced. In regard to the laying out of a building, the provision of sufficient floor space and the distribution of the various departments are principally to be considered, while design and construction are matters mainly in the hand of the building engineer, but at which the latter must consult the parties who are in charge of the layout of the place.

The property having been settled upon, the layout of the building has still to be worked out, and this is quite a difficult matter and should not be done hurriedly by any means. As in most other fields, it is a good scheme to line out a number of layouts and then select one as best fit to one's needs. Below a proposed layout for an eight-story building is given, and it goes without saying that such a building is only required for the use of the company operating a great many products in a territory such as that of New York, Chicago or similar cities.

Plenty of Elevator Service

This proposed building covers a ground of 50 x 150 feet, with the long side facing the street, making the total area of the eight stories 60,000 square feet. The building has two car entrances, the main one being in the rear, and a passenger entrance which leads into the main office. A passenger elevator at one end and two freight elevators, each 12 feet wide and 27 feet deep, serve for providing means of transportation between the several floors, and the freight elevators are so constructed that one has a capacity of 8,000 pounds and is built for fast service, while the other is built for slow work and can carry 15,000 pounds. These two elevators are in the right rear corner of the building. Opposite this corner, on the right, there is a stairway leading through the entire height of the building, and a second stairway is in the extreme left rear corner. The left side being at the north end, and the building front facing west, all the offices are arranged on that side, and in many cases in the northwest corners of the floors. The left stairway being in the northeast end of the building, projects into the interior thereof, and the passenger elevator shaft does likewise; at the west end of this projection, facing the various floor offices, there is a small elevator of the dumb-waiter type for transporting articles from the stockroom on the second floor to the others. All the windows on all the floors are made of semi-transparent glass. A very elaborate sprinkler system should be netted through the whole building, and ample provisions for plenty of ventilation be made. The same up-to-date spirit should rule with regard to lavatories, individual lockers for the men and to the condition of clean floors.

The building itself should be of fireproof, reinforced concrete construction and a model of present factory-building practice.

Taking up the different floors and their utilization in turn, the following arrangement would suggest itself:

Ground Floor—The left end of the building, excepting the section which includes the passenger elevator and stairway, is taken up by the office, where orders for repair parts and repair work are taken. A special stairway leads from this office to the cost department on the mezzanine above. The offices for passenger car and truck repair orders are separate. In this office is also the telephone switchboard. The remainder of the floor, excepting the two freight elevators, is taken up as standing room for the cars that come in to be repaired.

Second Floor—This place contains the stock room, where a practically complete stock is kept for all models made by the company. All the parts are kept in bins formed by partitions in shelves, which are arranged above each other, with the higher bins always having less depth than the lower ones; besides, there are always two rows of shelves placed back to back, giving, *en profile*, the effect of steps tending toward a peak in the middle. All the parts relating to one model are kept in bins in close neighborhood, and these are labeled with the number and model of the part, and the numbers are arranged in rotation. Thus all that is necessary to find a part is to go to the series of shelves containing parts for a certain model of car and then look for the number of the part wanted. The office of the stockroom keeps the stock records and maintains them correctly, deducts from them the goods issued on requisitions and watches for no division of the stockroom becoming understocked or sinking below a certain fixed minimum called the danger limit. The stockroom and office are separated from the entrance space into which the elevator and stairway open, by a wire-screen partition having a door and three windows, through which latter all parts are issued. Two of these windows serve for placing the orders for parts, and through the third the materials are issued.

Third Floor—This floor serves for dead storage of bodies and cars. The latter are kept on the floor, supported by small trucks or trestles used for easily transporting cars over the floor. Bodies may also be stored here, and in this case they are taken from the freight elevator bringing them up to a specially constructed wooden hoist operable by chains, which can be moved over the floor by means of little wheels. In this manner the hoisting apparatus is transferred near shelves which are arranged at a higher level, to which the body is then raised by means of the hoist being pushed on to the shelf from the trestlework. All bodies and cars in this room are wrapped in dustproof fabric covers. The places for cars on this floor are numbered for the purpose of easy location of cars there sorted, and near the passenger elevator there is a keyboard on which a round, white tag held in a black rim is kept for each car or body. On this tag the job order on which the body or car was taken over is given, together with the number of the space where it is kept, and all tags are arranged in numerical order of the space numbers of the nails on which the tags are hung.

Dustproof Paint Department Rooms

Fourth Floor—Several subdivisions of the painting department are stationed on this floor. Next to the freight elevators the windshield-frame painting and enameling department is located, where these parts are treated and when dry are stored, spaced properly by means of wooden blocks. The paint and varnish stockroom, also stationed on this part of the floor, is separated from the rest of it so that not a particle of dust can enter it and spoil the valuable stock.

Fifth Floor—The coach department on this floor is equipped with everything needed in such a shop. There might well be installed a cutting and a trimming department with sewing machines, hair-picking machines and other appliances for making possible the rapid execution of first-class work. All materials are preferably kept on overhead shelves, so as not to be in the way of anyone on one hand, and to make for ample utilization of as much space as possible on the other.

Inflammable materials are kept in a metal closet near the freight elevators.

Sixth Floor—On this floor chassis are painted. Tops are stored on shelves running along the higher portions of the walls, after having been washed by means of the revoluble washstand. The chassis coming in are jacked up on two four-wheel jacks, and after having been washed, are taken to the paint shop, which is separated from the rest of the floor. The finish varnishing room adjacent to this department is absolutely separated from every other portion of the floor, to the perfect exclusion of dust. Next to this department is the building carpenter shop, where general jobs for all-around use are turned out. This room includes all sorts of modern equipment for carpenter's work. Next to the elevator is the enameling room, where parts to be enameled are dipped and then dried in a special oven. At the southwest end of the building, adjacent to the stairway, are a number of lockers for car equipment and accessories, in which everything taken from a car or chassis when disassembling the same is taken and locked up, the locker being marked with a tag bearing name of car owner and number of the repair order.

Seventh Floor—The passenger car repair shop is stationed here, with benches along the window lines of east and west sides. A wide center aisle is always kept as free as possible for the transfer of cars through it. At the southwest corner is a wheeled stand carrying a testing body and tester seats. Slightly north of the middle of the east side of the floor the few principal machine tools needed are kept. Very near these a small stockroom, screened from the rest of the floor by wire, has been installed for the keeping of small parts, such as bolts, nuts, cotter pins, etc. Here, too, tools are kept for all around use on the floor, but they are given to workmen only against a receipt, so as to avoid loss of such material. A forge stationed left of the machine tool department is separated entirely from the other portions of the floor by a steel partition with glass windows, so that gasoline vapors, etc., cannot possibly gain access to this room. On a post in the proximity of the forge a board is kept on which all the repair jobs that have to be finished on the day are listed. This is one of the details which should be included in the service. Like all other floors, this one should be kept scrupulously clean, and, as in the cases of all others, there is a time clock on this floor for the workmen's timing.

Free Aisle in Center of Floor

Eighth Floor—Truck repairs are made on this floor, and for this purpose, a small stock room is kept near the passenger elevator, in which the most necessary small parts are kept. The repair benches are along the western line of windows, the center of the floor is kept free, as a rule to the extent of 50 per cent. of the space, for reason of easy moving of the trucks. The overflow from the passenger-car mechanical shop of the floor below is taken care of on this floor. There are two skylights giving additional light besides the windows.

On all these floors, minimum dirt and minimum obtrusion of light and air are first rules. It is through the carrying out of these, that the men should be kept tuned up to a psychological pitch, so to speak, at which they work more easily and better, considering a given job in a given time. There should be safety against fire, a time-keeping system equally fair to workmen and employer and all the conditions necessary in a shop to permit of a healthy mind in a healthy body, both of which are requisites for the success of employer and employees alike.

If this principle is made to permeate every department of the service station and every activity of each department, it of course makes for maximum economy in the work and consequent advantage of the car owner whose machine is taken to the department to be repaired. It may be a slight or great repair, the nature of the organization must infallibly react upon the work carried out in the service department. Every window and ventilator, every elevator and fire escape are as essential in producing perfect work as good machine tools, prime movers and system of supervision.

It must be kept in mind that service departments are not and should not be operated with a view toward profiting directly on them. If they are self-supporting, this is a fine result. But even if money is lost upon them, apparently, the loss is compensated for by the effect on the customer of service, provided the automobile made by the company furnishing this service is in itself a worthy, dependable product.

Keeping Job-Time Records

Records of employees' working times are now a general rule in most service departments, and the system employed for this work consists in the use of two blanks. The first is the well-known weekly clock card, which is stamped or punched every time the worker enters or leaves the establishment; the second is a blank on which every working period spent on a given job is recorded, so that it may be charged to that job. The design of clock cards has by this time been fairly well standardized, as the majority of service departments are using the pendulum type of time clock and there is but one type of card which fits this type of clock. Job-time cards, however, vary considerably in different places where they are used.

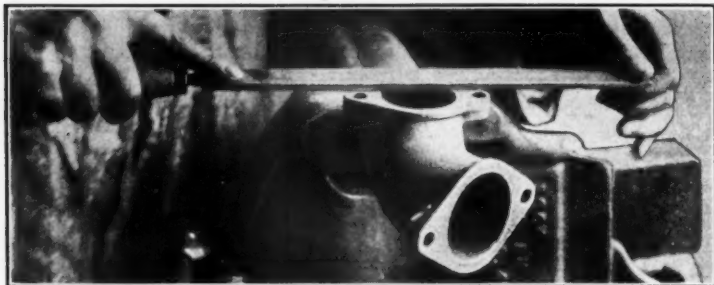
It should be borne in mind that the purpose of the time-keeping system is not only to know how many hours and minutes of the week each worker spent in the building or shop, but also how long he was actually at work. Hand-written job-time cards permit of his distributing his total time so as to make up the exact and full aggregate indicated by the clock card, while 1 hour or 1.5 hours a day may be wasted. Too much reliance on this point must not be placed on the foreman, as he is generally too busy to pay very much attention to everyone being busy at all times. Consequently, a positive timing system for the individual jobs is most desirable, and it is suggested that the same time clocks which serve for the weekly cards be used for stamping the job time cards of the workers.

Each man should, in addition to the weekly card, start a new card for each new job when beginning the latter, and every stopping and restarting time should be entered on this card. **It should be impressed on the men, not so much that every minute of their week must be accounted for, but that each job is well done within a minimum of time.** Allowing for a fixed percentage of waste among the total of a man's time, gradual education toward rapid execution of a job while maintaining the same standard of quality tends to beget better efficiency in an establishment than a system which actually is but a formality and neither saves money to the firm nor insures better service for its customers.

If the service department of a company, which takes care of many cars in a given territory, is operated through the space of 1 year, it will be possible to arrive at standard average times for most of the repair operations which come up. Once these have been found, it is possible to establish the rule that the standard time of a job, being an average value, must be adhered to by each man, while the quality of the work must come up to a certain standard of quality. If a man beats this time, part of the time saved should go to his credit, for instance, as follows:

Time Saved, Min.	Time Credited, Min.	Percentage Credited	Time Saved, Min.	Time Credited, Min.	Percentage Credited
10	5	50	40	15.20	38
15	7.25	48	45	16.20	36
20	9.20	46	50	17	34
25	11	44	55	17.60	32
30	12.60	42	60	18	30
35	14	40			

Thus, if during 1 week a man saves 1 hour 40 minutes by bettering standard time, he should be credited with 18 + 15.20 minutes which he could take off without his pay being reduced. A rule, that bonus time must not be accumulated for more than 4 weeks, could be established, and would make time saving worth while for the employer and employee alike.



The Rostrum

Says Electric Light Is Worth the Price

EDITOR THE AUTOMOBILE:—I was much impressed with the letter from Mr. Coombs, of the Prest-O-Lite people in last week's issue of THE AUTOMOBILE. This letter is timely, and I sincerely hope it will provoke a like discussion to the gear-box location that has been so well threshed out in your columns. I might preface these few words by stating that I am in no way interested in either the making or selling of electrical apparatus of any kind, while on the other hand the Prest-O-Lite people have an axe to grind, and I am not blaming them for it.

There are many things within that letter that are inclined, or perhaps intended, to scare out a prospective motorist about the electric lighting and starting of the new automobile at the outset of this communication where he claims that from 5 to 12 per cent. of the fuel consumed by the gasoline automobile is directly chargeable to driving the electric generator. Now this is positively ludicrous. I am not saying that they have not proved it under the conditions they mention upon the Speedway at Indianapolis.

It seems queer to me that a medium-sized gasoline motor giving 40-horsepower, and by adding an electric generator to it requiring one-quarter of a horsepower, or even less, and thereby increasing the fuel consumption 5 to 12 per cent., or in other words eating up fuel at the rate of 15 to 20 times in proportion to the power expended is not logical, and no engineer of any ability at all would countenance such a proposition.

I notice in test No. 4 that the car had no magneto. Could it be possible that this test was carried out on an old and obsolete motor that was built back in the days before the use of a magneto became general?

Electric Light Safer

I am not stating that electric lighting is cheaper than the gas route, even if it costs more. Isn't it worth more? The fact of the matter is that a car that is not electrically lighted and fitted with a good, reliable starter, whether it be electric or some other device, is not up to date and the car is not considered modern. If electric lighting is not superior, why does the public demand it? Is it not safer and more convenient?

In one statement, where they have heard that people having electric lights and no starter had to run the engine an hour or more before the battery was charged sufficiently to hold up the electric system, and on the other hand the tourists on the Indiana-Pacific run had to burn their lights part of the day-time to keep from overcharging their batteries.

It is quite self-evident that in the former case the parties had a short-circuited battery or defective wiring, causing discharging, or else the generating system was badly wrong and not delivering the juice as it should. And in the latter case it is plainly a case of being scared before they were hurt. There is not one battery in a hundred that is hurt by overcharging, to the other ninety-and-nine that have deteriorated badly from standing in a discharged state and allowing evaporation to

carry the water away and the exposure of the plates to the air.

Remember the batteries used to-day in lighting and more especially where both lighting and starting are used are radically different propositions to the old storage batteries used only for ignition. Where only ignition is used and at 6 volts, there is a small discharge of only 2 or 3 amperes to energize the coil, while starting a heavy six-cylinder motor at 6 volts often takes away above 200 amperes. A battery to give out such a heavy current has to be built in quite a different proportion to the igniter type. In the latter case the plates in the battery are much thinner and there are more of them thereby exposing more of the lead to the action of the liquid or electrolyte. A battery of this type is also capable of taking a higher rate of charging current.

Battery Life 4 Years

Most any sort of battery will take a charge continuous at the finishing rate without damage, or the damage is small in comparison to one run out. In another part of this tabulated report, where he charges up \$25 per year to battery renewals and states that 2 years is an excessive life of a battery. A battery with anything like decent treatment should easily last 4 or 5 years. I know of several batteries that have been used for 2 years and are in practically perfect condition to-day, and if this treatment continues they will easily last 3 or 4 more years. It is nothing uncommon for batteries used in electric railway and stationary purposes to last under decent treatment when floated on the line, as is the usual practice on the automobile, to last for 10 years or longer. Further along he states that he knows of no battery maker who guarantees his product for more than 1 year. In regard to this comment I see no reason why they should. Isn't it a fact that no car maker will guarantee any part of the car for more than 1 year?

This letter also cites as an interesting feature of electric light men and electric dealers using the gas for lighting their cars. Now there are several reasons for this. It may be that they use an old car to tinker around at their work, using the car for delivering or hunting line trouble, etc. Possibly the most of them have cars that have been in use previous to having them electrically lighted. But if they are buying a new car for family use and are able to put the difference in cost in a modern car and then neglect the improved lighting, I think it simply another case that is a parallel to the shoemaker who allows his family to go barefooted.

In this letter they state that the electrical service is doubtful, and go on to mention where a motorist would be in case his lights go out 25 miles from home. I fail to see where a man with an empty gas tank has anything on a man in the above circumstances. The fact of the matter is there is no reasonable excuse for either bungle.

Another event that I call interesting is that while the Prest-O-Lite company makes a business of selling gas and tanks

and would be naturally interested in any device to make a demand for gas, and while blaming the electric service as doubtful and unreliable, he never mentions a word about a gas starter for motors. Now as for a gas starter, I presume the motoring public has become familiar enough with the gas starter to know what it is. It is unnecessary for me to make further comment on that part of the matter.

Now about the average motorist as well as the average dealer being ignorant of the care of the electric apparatus. This is probably true in many cases, and as for myself I think that there are thousands of owners who drive their own cars or are driven by some member of the family that are as ignorant about all the other parts of the car as they are of the electric equipment.

Owner's Care Cheapest

It is a well-established fact that an owner who does his own repairing and looks after the upkeep of his car and learns to understand it and is not dependent on the dealer or garage man is more successful with his car, to say nothing of the difference in upkeep; furthermore he has more confidence in both his car and himself. Learn your electric equipment and study it and be able to make any minor adjustments that are necessary. But if you do get into trouble take it to some one who knows what is wrong and be sure that you yourself know that the party to whom you have intrusted this work knows his business, and if he don't, don't allow him to fool with or experiment with it. *Remember that because you take your car to a garage it's no assurance that any one there knows anything about your equipment, and it is an even gamble that he is as ignorant of the matter as you are. Simply being employed at a garage does not mean that he is a practical electrician by any means.* You had better go hunt up an electrician or some electrical worker that has nothing to do with the automobile business and have him look at it. Any practical electrician, whether he is familiar with an automobile or not, will soon learn and find out what is wrong with it. But above all to learn it yourself it is no harder matter to master the

electrical equipment on your car than it was for you to master any other part of the car. Simply because it is electrical doesn't imply that it is always magical.

Long Beam Desirable

Now about the push button racket that is mentioned about lighting the gas from the driver's seat for convenience, you then have a wiring system that is far harder to keep up and keep in reliable service than any electric lighting system, and it is this reason alone that has kept it from being universally adopted.

Another thing mentioned is where a one-half-foot burner gives more light and is more effective than the average 16 or 20 candlepower Tungsten lamp. Those people will have to show me when it comes to that, and prove it by a standard photometer. If I know anything about illumination it is a long piercing pencil beam of light that is desired to light the road in front instead of the roadside. If gas lighting is superior I wonder why the builders of electric cars don't adopt exclusively a gas system on them and strap a tank on in some convenient place to rely upon, and I think that the builders of the electrics go the limit in having all the conveniences that are possible to install on any sort of self-propelled vehicles.

In my mind the electric lighting or starting system will never supplant gas any more than the automobile will supplant the horse. All small, light cars of the lower price zone will be equipped with gas lighting, while the best class of strictly pleasure cars will all have to adopt electric lighting as well as starting.

I want it to be understood that I have nothing against the Prest-O-Lite people in any manner, and have no interest in the matter other than viewed by a practical electrician. I think it time now for the makers of electric lighting and starting to come across and give their views and some figures to enlighten the motoring public about their wares, as such information at this present day will greedily be absorbed by motor-dom.

Woodsfield, O.

J. K. MERCER.

Wants to Select the Best Machinery for Repair Shop

Editor THE AUTOMOBILE: I expect to build and equip a garage at this place within the next three months, and I would appreciate it very much if you would tell me what equipment I should buy to have a shop for high-grade work. Please give specifications of the machinery and tools that I shall need.

West End, N. C.

ROBERT B. COCHRAN.

—The tool equipment should comprise as far as the larger machines are concerned the lathe and drill press. Most of the heavy work can be done with these two tools although for forging and brazing you will need a gas forge and an anvil. A 10 to 14-inch lathe will be large enough to take all the work that you will get on ordinary occasion and by manipulation you can handle very large jobs with these tools. The drill press should be large enough to take everything up to a 1-inch bore and with it you will be able to perform such operations such as lapping in pistons, etc. For your bench tools a complete equipment will be necessary. Spanners, socket wrenches, a vise, torch, screw driver, gear pulley, punches, chisels, hammers, pipe wrenches, files, etc., will be necessities. Those outlined will give you approximately what is desired and beyond this point it will only be necessary to expand in case you desire to elaborate on the tools.

A clever workman can do many jobs with the tools mentioned above that another will often find impossible without the aid of more tools. A 10-inch lathe can do wonders in the hands of an experienced man who has sufficient ingenuity to manipulate it and the same may be said of the drill press. In other words the cleverest man needs the fewest tools.

Question Whether Six or Four Develops More Horsepower

Editor THE AUTOMOBILE: Does a six-cylinder motor of the same number of cubic inches as a four-cylinder develop as much horsepower at high speeds and can it attain as high a speed as the four-cylinder? If not, why not?

2—What is the compression of the average motor, and on the Mercer runabout and raceabout?

3—Are the valves on the rotary or sleeve valve motors able to remain open as long as the poppet, and is there any way of changing the timing on a sleeve or rotary valve?

4—Does the sleeve or rotary valve motor develop as much or more power as the same sized motor, same number of cylinders, all things being equal.

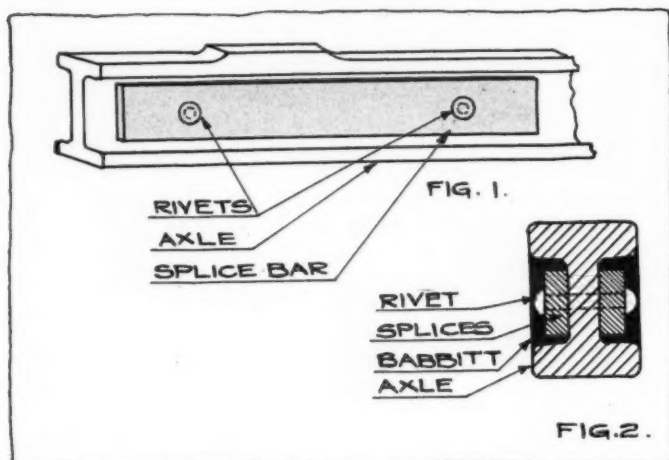
5—Did the Knight motor that was tested at the Royal Automobile Club of London in 1909 have the same number of cubic inches as the six-cylinder Packard that was tested at the A. C. A. and was the Knight motor stock?

Katonah, N. Y.

ROBERT F. DEGRAFF.

—1—This point is at present very much in debate. Many believe that owing to the fact that in a six-cylinder motor of the same number of cubic inches piston displacement the additional motor friction due to the increased piston area, greater number of bearings, great weight of reciprocating and rotating parts, will be sufficient to make a material cut in the horsepower delivered. There are others who state that the even torque of the six will cut down the inertia forces to such an extent that the power delivered is actually in excess of what it would be in a four-cylinder motor of the exact same piston displacement. At the present

Babbitt Used as All-Around Repair Metal



Figs. 1 and 2—Diagrammatic view of reinforced I-beam axle

moment there are comparatively no brake horsepower and torque curves of a six and four of the same displacement.

2—The compression on the average touring car motor when it leaves the factory is about 60 pounds. This gradually drops as the piston rings wear and the valves become pitted until it drops to the neighborhood of 40 pounds. The compression on the Mercer raceabout is between 80 and 90 pounds to the square inch.

3—The timing on the rotary or sleeve valve motors is practically the same as on the poppet valve with very often a little longer valve opening in the case of the former.

4—The power developed in the sleeve motors has varied considerably. On some designs tests have not shown a higher power than on a corresponding poppet motor while on other tests they have fallen down. Tightness of the sleeve and the power consumed in driving them have been big factors in the power output of the sleeve motor. When either of these have run above normal proportions the power output of the motor has dropped.

5—The piston displacements of the Knight motor tested at the R. A. C. in London and the Packard motor tested at the A. C. A. in New York were entirely different. Piston displacement of the Knight motor was 382.9 cubic inches. Of the Packard motor it was 414.7 cubic inches. Both were stock motors.

Carbon Dioxide for Tires

Editor THE AUTOMOBILE: Are the so-called tire tanks now on the market of real value? I understand many of them are filled with liquid carbonic gas. Will you please inform me if this gas has any injurious effect on the inner tube of a tire.

Richmond Hill, L. I.

WM. G. PARIGOT.

—Many of the tire bottles on the market contain carbon dioxide under pressure. While this gas is not harmful for the tire it has the property of passing through the tire more rapidly than does air. It is a fact that even in the air which is put into the tires some of the gases pass through more rapidly than others. The gas which remains in the tire longest is nitrogen. It is for this reason that after a tire has been pumped up several times the pressure will be maintained for a much longer time than originally. This is due to the fact that the air which was in the tire becomes more and more composed as nitrogen and hence leaks away less rapidly. It has been stated that carbon dioxide has a deteriorating effect on the rubber, but this has not been substantiated. A rubber tire is porous and the length of time it will hold air varies inversely with its porosity. Even the best tires, however, will show a much greater leakage of the carbon dioxide than they would were air alone used.

Reinforcing a Front Axle

Editor THE AUTOMOBILE: An automobile with a badly bent front axle rolled up to the door of my small repair shop a couple of years ago. The axle was of common I-section and had been bent by receiving a violent bump as often happens in the experience of automobilists.

I had straightened other axles, so proceeded in the usual way: heated it and bent it back to its original form. I had read that a bend made while steel is red hot is preferable to cold bending in that the elastic limit of the metal is not lowered and fibres are not under stress when the car is resting. That is why I always heat axles first and I have been quite successful in making my rebending jobs permanent. However, here was a case where the job came back in a couple of days. The shaft had bent again and I had the whole thing to do over again.

Determined to do the job right and retain the confidence of the village in which I lived and worked, I spliced a couple of plates on the web as shown in Fig. 1, riveting them on as tight as I could. I soon noticed that the splice bars did not hold perfectly. The axle was undoubtedly stronger than without the splice but it bent just a trifle, nevertheless, because it was not absolutely rigid. This annoyed me in no small degree although the owner of the car was apparently satisfied with the repair as it had saved him the cost of a new axle. I was not satisfied. I began wondering if I couldn't fall back on my old friend, babbitt metal, again. I figured that by filling all the cracks between the splices and the web and the splices and the flanges and embedding the splices entirely in babbitt, there would be no opportunity for bending of the axle before the strength of the splices would be brought into play. I obtained permission of the owner to follow out my scheme at my own expense, with the proviso that my indulgence would be at his expense if the repair proved to hold rigidly without sign of bending. I filled the crevices with babbitt as shown in Fig. 2 and made a good looking job of it, neater than without the babbitt and the repair has proved to be just what we wanted. The axle is still doing duty.

Brooklyn, N. Y.

W. F. SCHAPHORST.

United Rim Co. Components

Editor THE AUTOMOBILE: I note that the United Rim Co. or some such organization which manufactured demountable and detachable rims was recently dissolved. I believe that the corporation was in Detroit. If possible, please send me the names of all companies manufacturing demountable rims in Detroit.

Blue Mountain Lake, N. Y.

W. NAUMBERG.

—The United Rim Co. was a holding company owning the rim patents of Goodyear, Goodrich, Morgan & Wright, Hartford, G. & J., Diamond, and Continental. It was dissolved in April, 1913.

The companies now manufacturing rims in Detroit are The American Rim Co., Kelsey Wheel Co., Anglada Co., Booth Demountable Rim Co., Detroit Demountable Rim Co., Mote Demountable & Detachable Rim Co., and Jackson Rim Co.

T-head vs. L-head Motors

Editor THE AUTOMOBILE: Will you kindly tell me the advantages and disadvantages of the T-head and L-head motors? Would also like to see other readers' opinions on the subject in the near future through your paper.

Unionport, O.

A READER.

—This discussion has been carried on in different papers many times and has never yet lead to any definite end as to the superiority of one type over the other. The advantages claimed for

the L-head motor are as follows: Simpler casting, single camshaft, ease of inclosing valves with one plate, lighter weight, possibility of making valves readily accessible, and less space given to valve ports in the cylinder head.

The advantages of the T-head motor have been claimed to be, more power, charge is cleaner by keeping the exhaust gases away from the intake side of the motor, possibility of using larger valves without cramping metal between valves, more advantageously shaped casting on account of coring work and possibilities of introducing cooling water more completely around the valve stems and heads.

Wants Plans of Repair Shop

Editor THE AUTOMOBILE: I would be very much obliged to you for some plans for a garage, as per the following specifications. To be built out of brick or concrete, to have a fifty foot front, facing west. To be one hundred feet long, with an entrance in the rear. Rear end to be used as a repair shop. To be fitted up with city water, including toilet for shop and also for office.

Would also like another plan, same specifications as above, except to be 140 feet long.

Curtis, Neb.

RAY A. CONOVER.

—The accompanying plan, Fig. 3, shows an advantageous method of laying out a garage according to the dimensions 50 by 100 feet, which incidentally allows for a symmetric layout giving a pleasing appearance to the building. This general effect is obtained by the use of a separate 8-foot entrance and exit at the two ends of the front of the building, the store and office, together with the tire and accessory stockrooms, being disposed between these two passageways for cars entering and leaving the building. At the back portion of the garage structure, a 16 by 32-foot repair shop equipped with benches, a small tool room and the most necessary machine tools is bounded in by wire walls and doors, and opposite this shop, in the other rear corner of the building, there is the wash rack which may be fitted with an overhead revolvable washing device to advantage. While the 2-foot wall surrounding the building except on the front side is pierced by seven 3-foot windows in the shop corner, the opposite corner containing the wash rack is fitted with but one window. The central section of the garage serves for car storage and is lighted by two 12 by 32-foot skylights in daytime and by electric arc lights during the night. Gasoline and

oil tanks are kept underground behind the building, where there can also be installed a small forge. The pumps serving the cars which leave the building are stationed behind the tire stockroom, adjacent to the car exit. The main door of the store is wide enough to permit of a car entering the latter, although this may be achieved by way of a central 6-foot door connecting store and garage interior.

The construction of the building is proposed to be reinforced concrete, this being the one construction which according to present ideas is the most fireproof. Stone tiling for the floor is a good method of paving, although artificial stones such as xyolith serve as well and in winter are better adapted to hold the heat, an advantage over stone and cement flooring. The 140-foot garage will be explained next week.

Wants License Information

Editor THE AUTOMOBILE: Please give us full information through the Rostrum as to the license relations at present for Pennsylvanians touring New York State, or the New England states. Should possibly touch all the New England states if this trip were taken, and should like to know what fee is required, if any, in such of these states, and how best to secure the needed credentials, for touring these states.

Elizabethville, Pa.

S. H. KNISELY.

—An analysis of the various statutes now in force in all the states giving the license relations appeared in THE AUTOMOBILE on May 9, 1912. In this article it stated that non-residents of New York could come into it providing there were reciprocal relations between those two states. Tourists from New Jersey are allowed 15 days in New York and vice versa. A motorist from Pennsylvania is allowed 10 days per year in New York. The various New England states vary in their allowances, but all allow 10 days or more. Rhode Island is exempt, Maine, 20 days, New Hampshire, 10 days, Massachusetts, 10 days, Connecticut, 10 and Vermont 10.

Please Sign Your Inquiries

The Editor of the Rostrum is in receipt of several letters which offer no clue to the identity of the sender because they are signed Subscriber, Reader, by initials or noms de plume. These letters are held and will be published as soon as the senders identify them.

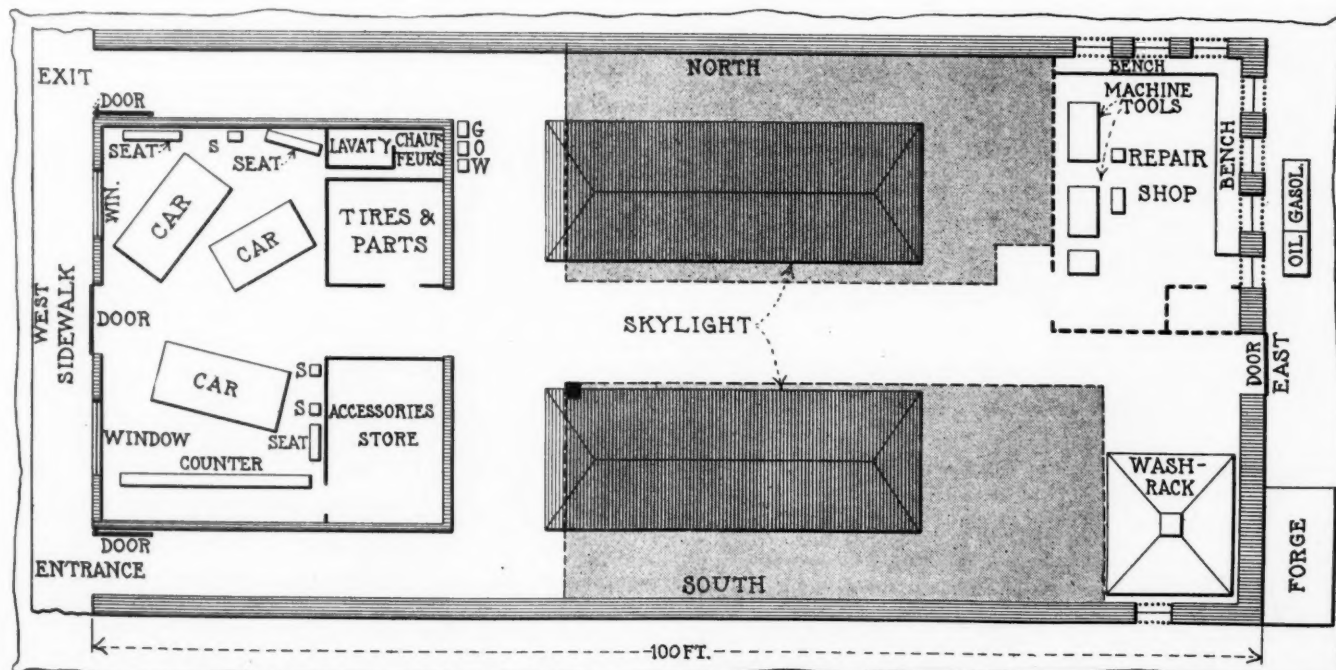


Fig. 3—Plan view of floor of suggested garage for storage store and repair purposes having 100 foot length

Six-Cylinder Abbott Added for 1914

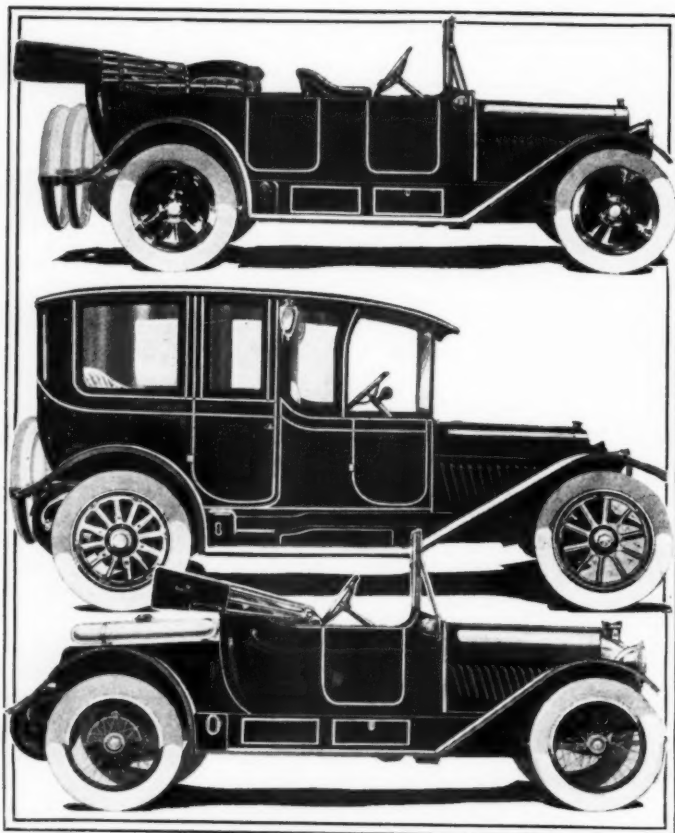


Fig. 1—Three Abbott six body types, seven-passenger touring car, limousine and roadster all mounted on 130-inch wheelbase

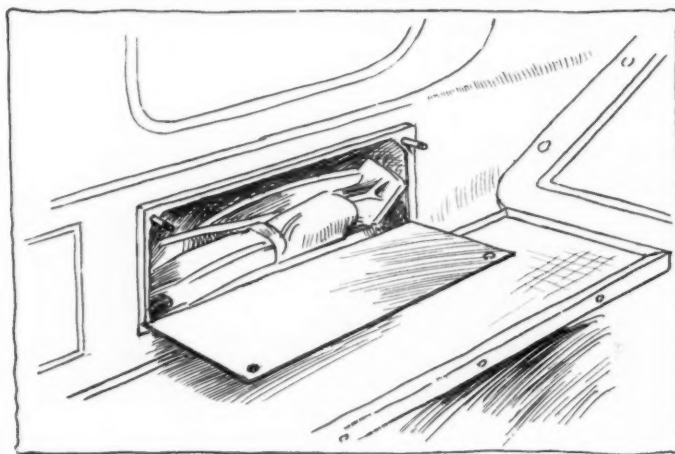


Fig. 2—Tool box behind apron on right side

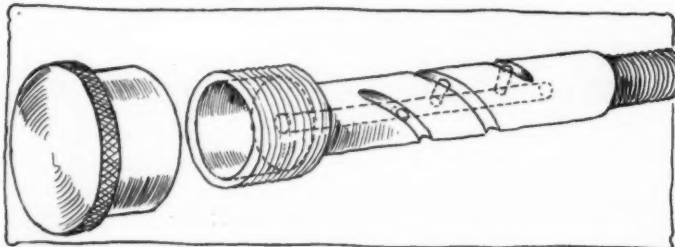


Fig. 3—Lubrication of spring bolts in which spiral groove distributes to entire bolt surface

Left-Side Steering, Unit Power-plant, and Gasoline Carried in Rear

THE Abbott Co., Detroit, Mich., while continuing its two 1913 four-cylinder models for next season, has added a six-cylinder model, the Belleisle light six, which is an up-to-date product embodying many chassis and body improvements not used in the present models, as well as marking the entry of this company into the six-cylinder field. It uses a unit motor, clutch and gearset supported on three-point suspension system, the motor being a Continental with cylinders in groups of threes, the clutch a multiple-disk type, and the gearset a four-speed Warner with a direct on third, and what is known as an auxiliary indirect fourth speed geared 25 per cent. higher than direct, and intended for speeds above 35 miles per hour.

This new Six is manufactured in one wheelbase, 130 inches, and takes three styles of bodies, seven-passenger touring car, roadster and limousine, all designed to be interchangeable for use on the same chassis. Frayer wire wheels are standard on the roadster and wood wheels on the other models. All are fitted with steering column on the left side, a contrast to right-side wheels during 1913. The gearshift and emergency brake levers are mounted in the center of the floor boards.

Another change is mounting the gasoline tank beneath the rear of the frame instead of under the front seat as in previous models. It is a cylindrical design with 20 gallons' capacity. Pressure is maintained by an eccentric-driven pump on the motor with an auxiliary hand-pump.

Spare tires or wheels are carried in rear of the gas tank, the carrying bracket B, Fig. 7, having a socket into which the tire irons attach. Placing the additional weight of the gas tanks and spare tires on the rear has called for a strengthening of the frame at this point. This has been done by heavy gusset plates, to which the springs also attach. The upper plate rests above the side member, but riveted beneath the channel cross-member and is stiffened where it carries the spring by a brace H. The strain of the gasoline tank and tires is also taken on the lower cross-member through an iron K, which bears against it and is riveted thereto.

Electric cranking and starting call for the Auto-Lyte motor and charging generator, both of which are separate units mounted on the left side, the generator gear driven and the motor mounted well to the rear and fitted with an inclosed drive to the flywheel. Both are 6-volt units.

By careful construction and proportioning the weight of the complete seven-passenger touring car with top, windshield and standard equipment has been kept at 3,625 pounds. Weight has been reduced in not a few respects, one being the elimination of the mud apron and using instead fish plates to bridge the intervening gaps between the crankcase and the frame.

The Continental motor, with its L-type cylinders cast in blocks of three, has a bore 3.75 inches and a stroke 5.25, this giving an S. A. E. horsepower rating of 33.5. The piston displacement is 487 cubic inches. In grouping the various motor appearances symmetry has been kept in mind. On the left are the steering gear, starting motor and charging generator; the right accommodates the Bosch high-tension magneto and the carburetor. In the motor light reciprocating parts and well-balanced construction have eliminated vibration to the minimum, and there has been an approximate increase of 15 horsepower due to these features. Each cylinder group carries rectangular plates inclosing the valves, and also incorporating a breather-type construc-

tion, which aids in simplifying the motor in that the conventional breather pipe is eliminated. Each valve cover has two of these traps, which have an internal bridge to prevent the splashing out of oil.

The Auto-Lyte generator is mounted on the left side and driven off a continuation of the pumpshaft at twice engine speed. This is sufficient speed so that it begins to charge the battery at 8 miles per hour, and reaches its maximum charging rate of 16 amperes at a speed of 15 miles per hour. The construction of the Auto-Lyte generator is such that by the use of a bucking coil higher charging above this speed is eliminated. The battery is a 120-ampere-hour Elba, mounted under the front seat. The magnetic cutout is conveniently mounted under the left front seat and the switch beneath the floor.

The Auto-Lyte starting motor is located on the left with its entire drive to the flywheel neatly inclosed. It is geared 35 to 1, and carries the usual pinion for meshing with a ring of teeth in the flywheel. It rotates the gasoline motor at 175 revolutions per minute. The operation of the starter motor has been simplified in that it is now controlled from the gearshift lever by moving same in a forward left position, as indicated in Fig. 6.

The switchboard for regulating the lights is well positioned on the wood panel beneath the front seat, where it can be reached by the driver or the passenger to his right. It is a five-button

switchboard. Beginning from the left side, that is the left side of the driver, the buttons are, cowl gauges, tail light, dashlight, headlight, and last a dimmer effect on the headlights by connecting them in series.

A feature of the transmission system is a multiple dry-disk clutch which forms the connecting link between the motor and gearset of the unit power plant. One set of disks is supported on a spider S and interacting with these is the other set on the spider S1, fitted on a tapered shaft which is continued rearward and has formed integrally with it the master gear G of the gearset. A readily-adjustable double-coil spring is used for clutch engagement, this spring being particularly compact, a feature desirable in unit power plants where the aim is to couple the various units as closely as possible.

The four-speed gearset affording direct drive on third with the fourth geared up 25 per cent., is of vertical design in which the splined mainshaft is located directly above the secondary shaft. Both shafts are mounted on Timken bearings and the mainshaft at its forward end has a roller bearing within the gear G, and an individual ball thrust B, which is accommodated by concaving the opposings ends of the aligned shafts. Each of the sliding gear units on the mainshaft is made up of two gears, the forward one an integral construction, whereas the rear has the second-speed gear in the form of a ring of teeth bolted to the large low-speed

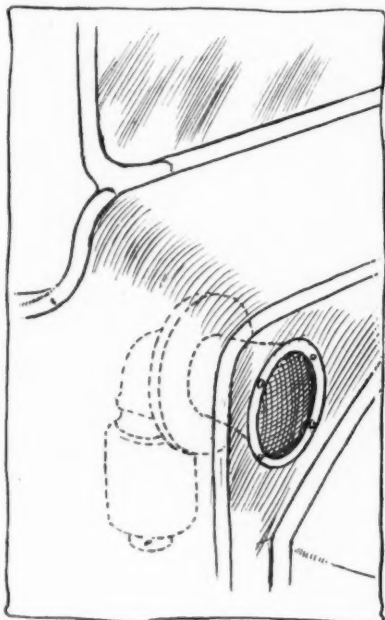


Fig. 4—The electric horn is carried conveniently under the dash cowl, where it is well protected

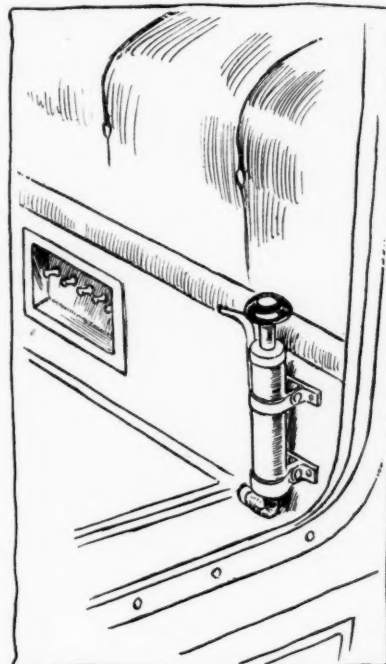


Fig. 5—Lighting switch buttons and air pump

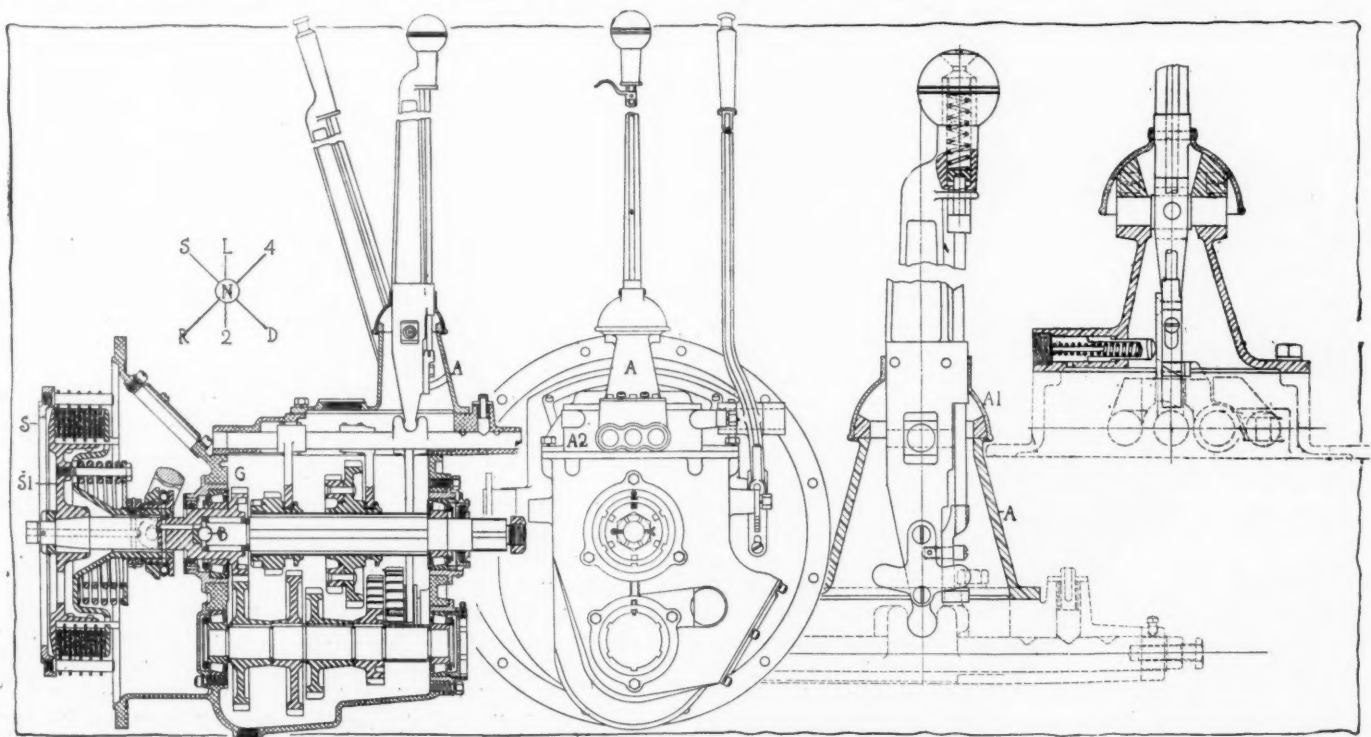


Fig. 6—Vertical section of Abbott clutch and gearset, showing mounting of gearshift lever and protection against dust

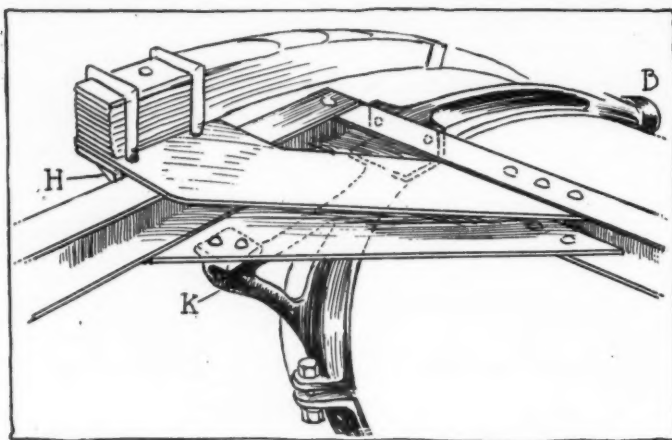


Fig. 7—Rear construction on the 1914 Abbott car

gear. All gears on the countershaft are made with extension hubs, thereby avoiding the necessity of using spacing sleeves to keep them in their respective positions.

Use Radius and Torque Rods

Mounting both the gearshift and the brake levers on the gearbox has given a particularly compact construction. The cover cap A which incloses the lower portion of the gearshift lever is completely covered by a dust cap A1, not unlike that used in universal joints, and giving equally dust-eliminating qualities irrespective of the position of the lever. Such a construction is quite essential when it is remembered that this lever has not fewer than seven different positions shown diagrammatically in the upper right Fig. 6. With the lever vertical it occupies neutral position; straight forward and back give first and second; swinging to the right and moving forward and back give fourth and direct; and swinging to the left or toward the driver operates the starter when advanced and the reverse when rear.

Chrome nickel steel is used for gears and nickel steel for the shafts of the set. On direct drive the ratio between the motor and rear wheels is 4:1, and on the indirect fourth 3:1.

From a constructive viewpoint the gearset is an accessible design, in that the dust cap A forms an inspection plate for the set, carrying as it does the lubricant filler; and the complete cover A2 contains within it all of the gear-shifting mechanisms, together with the interlock plunger, so that with the cover off the shift lever is not molested so far as its relationship with the shifter rods is concerned, all coming off in one unit.

The usual precautions are taken to prevent lubricant leaking. The countershaft bearings are well capped with locking measures to prevent their loosening. Both front and rear ends of the mainshaft are provided with packing glands.

From the gearset drive is through a propeller shaft carrying two Spicer universal joints. The rear axle transmits its drive to the radius rods, which attach to the frame through ball-joint ends fitted with grease cups. At the rear they are hinged to the axle. Supplementing these radius rods is a specially long torque tube.

Using both radius rods and torque tubes takes all propulsion strains from the rear springs and so that they are shackled at the forward ends, giving every freedom of suspension movement. They are three-quarter elliptic designs, 50 inches in length, and are made specially heavy to carry the fuel tank and demountable rims, or wheels in the rear. They are mounted on the axle.

The rear is of floating construction, using chrome nickel shafts and nickel steel gears.

A precaution and neat construction in the spring shackle bolts, to insure uniform lubrication from end to end, is a spiral groove in the surface of the bolt Fig. 3. This groove is fed from a central hole through three radial holes, distributing grease to all sides of the bolt. The grease cup is an integral portion of

one end of the bolt. There is no possibility of losing it through the vibration of the car.

The frame construction differs from that used last year in that the double-drop effect of the side members is eliminated, there being but a single upsweep in advance of the rear axle. The insweep at the dash has been eliminated, although there is a slight conversion of the side members toward the radiator. The frame is of 9-32 stock, with a 4 1-16-inch maximum depth and maximum width of 3 1-4 inches.

An example of clean running-board construction is that of hiding the tool box under the apron which connects the running board with the frame. Beneath the front door on the right a large tool space is provided (Fig. 2) with a conveniently downwardly swinging door.

More versatility than ever before is shown in the mounting of electric horns, and in this respect the Abbott company has selected a position under the cowl at the right where the horn is entirely protected. None of the funnel extends beyond the vertical part of the dash and its presence here is only shown by a fine-mesh wire screen.

In addition to its six-cylinder models the Abbott company will continue its two four-cylinder models of this year, incorporating in both of these the following improvements: The cowl dash hastaken the place of the straight type, a change which has necessitated a few alterations in the lighting switches. The rear springs are heavier in order to support the spare rims which are now carried in rear. The steering wheel and right-side levers are continued as is the locating of the gas tank under the front seat.

The smaller of these models has a motor 4.125 by 4.25, its horsepower rating being 27.30; its piston displacement is 280.6 cubic inches. It uses a L-head motor with cylinders cast in pairs and has chain-driven Auto-Lyte generator for electric lights and the Auto-Lyte starting motor. The multiple-disk clutch and three-speed gearset are in unit with the motor, the wheelbase is 116 inches and 31.5-inch tires are used all around.


The larger four-cylinder models uses 4.5 by 5.5-inch cylinders, its rating being 32.40 horsepower and its piston displacement 349.9 cubic inches. The general chassis layout is the same as that of the smaller model. Its wheel base measures 121 inches; front tires are 35 by 4.5, and rears 36 by 4.5.

An Interesting Fire Truck


PROBABLY the most spectacular vehicle in the recent English show was the fire engine on the Commercial Car Co.'s stand, a production with a six-cylinder motor of 7 inches bore and 8 inches stroke, developing 150 horsepower. This is easily the largest motor which has been used in commercial vehicle work so far. The drive to the turbine pump at the rear of the frame is direct, an indirect set of gearing leading to the gearbox whence the road wheels are driven by side chains. The vehicle can easily exceed a speed of 50 miles per hour. An interesting feature is that there is a shunt leading from the turbine pump to the engine so that the latter can be kept cool if running at full speed with the vehicle stationary.

Another interesting vehicle on this stand is the tip-up refuse wagon. This has been sold for service in Toronto and is of a type which has found considerable favor with many municipalities in Great Britain. It is fitted with a telescopic worm gear which is driven by a clutch through a special gear set in a rear extension of the gearbox. The all-metal body has a capacity of 6 cubic yards or a net load of 6 tons. The gearbox has five speeds, the fifth an indirect fast speed for use when the vehicle is running light. A 40-horsepower, four-cylinder motor is fitted.

In the heavy vehicle class for 6-ton loads, the steam engined wagon proves a sturdy rival of the orthodox type, though the gasoline motor is steadily gaining ground. By using compound engines with highly superheated steam these steam wagons run very economically and they are usually well cared for by the drivers.



The Engineering Digest



Ensemble of Means Employed to Raise Fuel Efficiency in Peugeot Racing Cars— Mechanical Motor Starter Described—Variable Piston Stroke Graphically Investigated—Twin Wire Wheels—Bobeth's Spring and Tire Data

RECENT Improvements in Peugeot Racing Cars.—At the race on the Dieppe circuit in 1912 the winning Peugeot car used gasoline at the rate of 23 liters for 100 kilometers. At the *grand prix* race this year 20 liters was the maximum which it was permitted to use and the maximum weight was 1,100 kilograms. With these restrictions in view certain changes in the racing model were undertaken during the year, and these are described by Henry Petit, though with some reservations, he says, with regard to some details on which the manufacturer prefers to maintain a discreet silence.

The main idea was to increase the fuel efficiency of the car as such, which meant to increase both the thermic and mechanical efficiency of the motor, to reduce waste in the transmission, including the spring suspension, and to hold the weight down. The motor is a monoblock of 100 millimeter bore and 180 millimeter stroke. It is offset with relation to the crankshaft about 1.5 of the crankarm length [that is, about 18 millimeters]. This reduces the length of the connecting-rod and therefore also its weight, makes the motor a little lower and evens out the motor torque a trifle. The pistons are of steel and extremely light. Each has two piston rings of the Faudi model. The piston pin is secured to the connecting-rod by a collar and a bolt and oscillates in two bronze rings secured to the piston.

The crankshaft works in three ball-bearings and, in order to keep the central bearing within reasonable dimensions, is built up of two parts joined by cone and keys in the middle. The combustion chamber is nearly semi-spherical. It was at first attempted to make it spherical by hollowing the top of the piston, but this was given up.

There are two induction valves and two exhaust valves for each cylinder. They enter directly into the cylinder head, and their stems are at an angle of 60 degrees with a horizontal plane. Rocker arms have been avoided by placing the two camshafts directly above the valves, and here an ingenious arrangement of the tappets is observed. The camshafts receive their motion from the crankshaft through three gear pinions working immediately in front of the foremost cylinder. The spark plug is exactly in the cylinder axis.

The clutch is of the inversed cone type and faced with Ferodo. The motor and the gearbox—which is of the usual four-speed type with three sliding rods—are mounted together, without any universal between them, on a substantial false frame suspended in the main frame by one socket in front and two in the rear.

The rear axle is altogether of aluminum reinforced by a tension rod. The drive shaft has two universals. The springs take up both push and torsion. They are placed beneath the frame reaches and are straight springs, pivoted in front, of course, and working with compression shackles at the rear.

[The reason for the use of shackles which work under compression is seldom mentioned, but is perhaps found in the fact that it permits the car to climb a given obstacle with less flexion than is necessary with shackles working under tension, as may be readily shown by a simple sketch. The compression shackle moves the spring up a little when the spring flattens and the shackle swings out, while the tension shackle moves the spring

down against the obstacle. This action is reduced in the case of the tension shackle when it is made longer. The compression shackle thus gets to its credit that in practice it makes the resistance to spring flexion slightly progressive, and the more so the shorter the shackle is, and this means also a slightly greater strength for a given flexibility.—ED.]

Shock absorbers are placed on both axles. Those on the rear axle have their friction collars mounted on the circumference of the axle itself. In addition, anti-rebound straps are stretched from the axle to the rear cross-member of the frame.

The vehicle makes 168 kilometers per hour on the level with a fuel consumption of 20 liters for 100 kilometers. The driving-wheels are of 880 millimeters diameter with tires 120 millimeters broad, and the bevel gear drive has a ratio of 22 to 48. The maximum power is obtained at 2200 revolutions of the motor, which corresponds pretty closely to a speed of 168 kilometers. The top piston speed is thus about 13.2 meters per second.

During the race, Boillot's car consumed about 18 liters per 100 kilometers and that driven by Goux about 17 liters. At previous trials, when the speed was only 80 kilometers, the consumption was reduced to 13.5 liters. The thermic fuel efficiency amounts to about 40 per cent. of the total caloric value of the fuel used.—From *La Vie Automobile*, August 2.

BOILLOT'S Troubles during the Grand Prix Race.—According to Boillot's own story, the following things happened to his car during the race: He had to stop on the second, third and fourth laps because the terminal clips of the ignition cable broke. They were new and appeared to be brittle. After replacement of the whole set the trouble did not recur. A little later one of the lubrication sights broke. The metal had been screwed down too tight and the glass yielded to the pressure in the oil system. This was remedied by replacement while the car was going at full speed. In the neighborhood of Boves the road was so rough that Boillot had difficulty in holding his seat. Five laps before the end he felt water sprinkling into his face. He found the rubber tube in the cooling-system burst. This was repaired and more water was poured in, and time was lost in finding the cap for the radiator, as it had been misplaced (not being hinged). The motor now refused to be started. A dozen times the crank was turned without effect. Six and a half minutes were lost before success ensued. Almost at the end of the race the timing-lever broke, and the last stretch was made with the maximum advance of the spark.—From *Automobil-Revue*, July 26.

IMPROVED Rofill Motor Starter.—Among mechanical motor starters one which has not yet been proved worthless is the Rofill, hailing from Belgium, the mechanical elements of which were described and illustrated in *THE AUTOMOBILE* of April 17. Since then it has attracted notice in France and other European countries and an improvement has been introduced by which a uniform movement of the starting handle imparts a

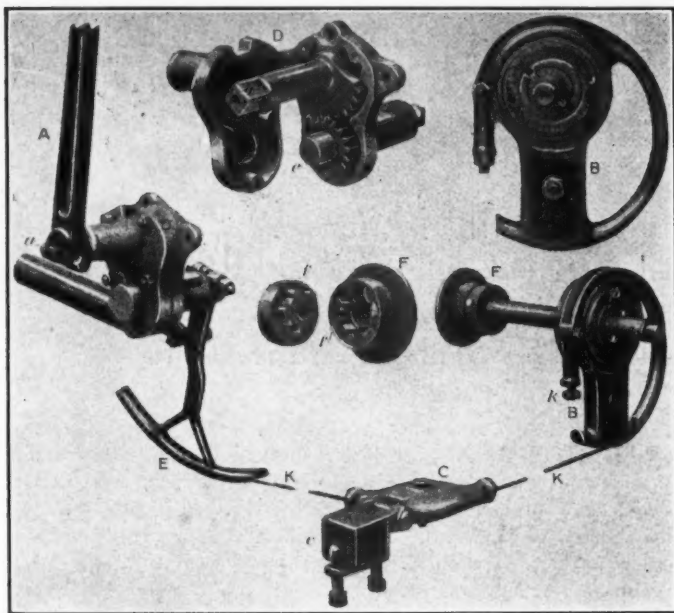


Fig. 1—Arrangement and details of the improved Rofill mechanical motor starter, which is making headway in Europe

movement of progressive angular velocity to the crankshaft. By this provision it becomes easy to overcome the initial inertia of the motor, which is considerable, while the speed for overcoming the highest compression and wringing a spark out of the magneto comes as naturally as if the crankshaft were turned by an experienced hand. The simple means by which this is accomplished consists in running the operating-cable over a spiral track on which it is wound from the larger to the smaller portion. The forms of the device are shown in Fig. 1, in which the three lower figures also give the relative positions of the different parts of the device on a car. The handle A is placed next to the driver and, when pulled toward him, pulls the cable K by way of bellcrank C, which is clipped to the front vehicle spring, and thereby turns the spiral pulley B which is placed in the same relation to the crankshaft as that of an ordinary startingcrank. A cylinder below the lever contains a coil spring serving to moderate the shock of a possible backfire, which furthermore is rendered harmless through the fact that it throws the lever forward and therefore away from the driver. The same forward movement of the lever returns the device to the starting-position, a spring within the spiral pulley serving to draw the cable taut. Some details are shown in the central and upper figures in the illustration.

A lever movement of convenient amplitude, and one which gives a pull on the cable for a pull on the lever and at the level of the crankshaft, is produced by making the lever turn one of two gear sectors and proportioning the other sector suitably for the desired end. It is the shaft of the second sector which actuates the moderator-spring in which the first force of a back-fire is absorbed. The free wheel *b* in the spiral pulley allows the pulley and cable to return to the position for starting without taking the crankshaft along but, of course, does not prevent the reversed crankshaft from taking the pulley with it, since this reversed movement of the shaft means the same relation to the free-wheel mechanism as that produced by turning the pulley forward.

The clutch between the pulley-shaft and the crankshaft is composed of two little disks with notches and six rollers. But for the presence of the rollers the little disk could always turn freely within the other. The larger disk is secured upon the crankshaft, and the notches formed within its circumferential flange are large enough to give room for all the rollers when the motor is running and the rollers are thrown outward by centrifugal action. But when the motor is to be started the

three rollers which at the time are at the top drop partly into the notches in the inner disk which is secured to the pulley-shaft, and these notches are shallow, so that the rollers project and make the inner disk, when it is turned, take the outer one with it.—From *Omnia*, July 19.

SUMMARY of an Investigation of a Motor with Variable Piston Stroke.—It is only during the past few years that a few designers have experimented with motors in which a variable stroke is intended to produce the same effect with regard to the handling of variable loads at variable speeds which is ordinarily obtained by means of the gear changes. Two of the constructions which have been tried have been described in these columns in 1911 and 1912, and one of these, the Paduvani-Rietti, has been installed in a car and made a not unsuccessful trip from Switzerland to Berlin. Another construction has been materialized by Gill & Aveling of England and the principle of its design has been very elaborately investigated by graphic methods by Dr.-Ingenieur A. Nerretter of Nuremberg, Germany, largely with a view to ascertaining whether the principle of variable stroke is sufficiently promising to warrant following it up in a practical manner. The last instalment of the account of this work of research appears in *Der Motorwagen* of July 31 and contains a summary from which the following is taken:

The weight of the movable parts in the Gill-Aveling motor amounts to 125.28 kilograms, including the crankshaft, while the weight in a normal gasoline motor is only 50.32 kilograms, if its stroke equals the maximum stroke of the new engine, and only 20.4 kilograms if it corresponds to the shortest stroke. On the other hand, the weight of the gearbox is saved.

With an adjustment for long stroke, the greater weights of the moved parts produce very large values of the moments of inertia which have to be taken up, but with adjustment for short stroke the inertia is in favor of the new type. It is also an advantage that the maximum piston speed occurs considerably before the middle of the stroke and that this peculiarity is more pronounced the longer the stroke is made.

Inequalities in torque are, without flywheel, about four times as great as in normal motors when long stroke is used, by reason of the very different speeds of the weighty parts at different points in their movements, but at short stroke the uniformity of the torque is improved, as compared with the normal, because the working strokes overlap.

The most favorable speed lies with the new motor between 300 and 500 revolutions per minute as compared with 800 to 1100 for comparable normal motors. This is unfavorable, since it is desirable to improve the efficiency per weight unit by increasing the speed.

The new motor seems, by reason of its greater weight for the power developed, mainly adapted for heavy vehicles where weight plays a subordinate part. Its principal advantage, on the other hand, and one of considerable value, lies in its ability to accommodate itself to different loads and speeds without losing in thermic efficiency.

WIRE Wheel for Twin Tires.—Whether the hub of a demountable wire wheel with twin tires should exceed in length the combined width of the two rims in the same proportion as the hub in single wire wheels projects at both ends beyond the planes of the single rim, may be a question for discussion, but the R. A. F. company in France answers it in practice by placing in the market a wire wheel for twin tires in which the demountable hub fits on the ordinary fixed hub and axle end—perhaps with an eye single to its easier adaptation to existing vehicles.

The two rims are united upon an intervening ring of steel shaped so as to receive the curvature of the rims snugly and riveted to them. The characteristic feature of the construction consists in the manner of lacing the spokes, by which each rim is secured independently to the hub by three sets of wires. The method used may be understood by means of the illustration,

Fig. 2. Each rim gets the benefit of the full length of the hub, but the wires in sets 1 and 6 naturally converge toward the center instead of outwardly.—Illustration from *Omnia*, July 26.

BOBETH'S Tire and Spring Data—At the tests of a Protos shaft-drive and a Nacke chain-drive chassis by which *Dr.-Ingenieur* Bobeth laid the foundation for the spring and tire data contained in his book on this subject—reviewed in these columns last week—the findings relating to the efficiency of gears and of the total power transmission are of interest, but all the tables and curvograms are so arranged, in accordance with the stiffest academic traditions, that their meaning can be made out only by close reference to the text of the book in each instance.

No busy person has time to read a book so arranged unless he is obliged to go through the ordeal. Dr. Riedler, the foremost German authority in the field, did not commit the same error in his books on "Scientific Valuation of Automobiles" but made them as easy to read as the subject permitted.

With regard to the gear box it was found that the efficiency was a nearly constant percentage of the power transmitted and that it reached 93 per cent. on direct gear. It was found slightly higher for the low and the second gears than for the third, and for this a value as high as 91.3 per cent. was established. In the case of the chain-drive chassis, the maximum gear efficiency was 92.3, or practically the same as for the shaft-drive, as might be expected, and the total efficiency of the transmission by the two systems followed similar proportions. The high efficiency of the gears agrees with the results recorded by Dr. Riedler, and the author draws the inference that attempts to achieve improved efficiency by construction of a different type cannot be considered promising.

[From another viewpoint, however, an efficiency of 92 per cent. means a loss of 8 per cent., and this is represented by a certain amount of wear of the mechanism, gradually resulting in a greater loss and finally in repairs or replacement of the parts. If, by gears which are better made or by a different construction, the efficiency were raised to 96 per cent., even though at considerable cost and effort, the loss at the beginning would be only 4 per cent. and it would be a matter for closer examination to ascertain if such a reduced loss did not also mean that wear and deterioration was reduced in the same or a still more progressive proportion, which would be a result well worth striving for. This viewpoint has been brought to public attention forcibly in connection with the competition of the worm-gear drive with the bevel-gear drive for the rear axle, and further suggests that not only the amount of friction and loss is of practical interest but also its distribution, since it stands to reason that a distribution over many or large surfaces will affect deterioration and the consequent repairs or replacements less rapidly and seriously than concentration at a few points. The question of compound reduction gears in the rear axle, for example, should probably not be considered with sole reference to their total efficiency if it can be shown that the losses and wear sustained in them are smaller per square inch of their working surfaces than those sustained by transmission through a single pair of bevel gears.—Ed.]

With regard to the power losses in the total transmission in the shaft-drive vehicles Dr. Bobeth finds that they grow but slightly with the power and that therefore the efficiency is considerably increased when more power is transmitted. This was not the case, however, when the higher power was used to produce high speed (75 kilometers per hour), as, then, the losses due to flexion of tires grew rapidly. These losses were shown to depend more upon the rapidity with which the deformations of the rubber fabric had to be effected than upon the size of the deformations; that is, more upon speed than upon load.

The deformations depend partly upon the load supported by the axle and partly upon the inflation of the tire, but it was found that a given deformation due to increase of the load caused greater losses than if it was due to reduced inflation

[but it is not made clear whether this difference is figured on a percentage basis or is only the natural result of higher power being used for the increased load and not for the reduced inflation].

A number of comparative tests of different tires are also tabulated and show considerable variations, such as the much smaller losses sustained with solid rubber tires than with pneumatic tires, but these results, as well as those mentioned here before, refer only to conditions corresponding to a smooth road surface. They are all modified by the tests representing travel over rough roads.

The power consumed in raising a vehicle over inequalities in the road surface was seen to be so large that, for example, the vehicle with a tire inflation of 4 atmospheric pressures running over certain humps at 22 kilometers per hour (which was the speed giving the worst possible jouncings under the conditions of the test) consumed less power than with the inflation raised to 8 atmospheres, despite the greater loss due to tire deformation.

For smooth roads the vehicle with shaft-drive was shown to have a slightly higher all-round efficiency than the chain-drive vehicle, and this difference was only accentuated under a succession of road shocks, but, as referred to last week, the results relating to oscillations of frame and axle, and therefore to comfort and perhaps tire wear, were more favorable to the chain, mainly because the general construction of the chain-drive car gives freer play to the vehicle springs than that of the average shaft-drive car.

On the subject of spring and vehicle frame oscillations, which is the author's principal study, he lays down the tested observation that it is not only the first compression stroke of the spring which has a strong influence on the frame oscillations but also the second compression following the first rebound.—From *Bobeth: Leistungsverluste und Abfederung von Kraftfahrzeugen*.

International Show in Berlin—The international union of automobile manufacturers at its session in Geneva on July 8 discussed the "American peril," arriving at the conclusion that it could be met best by improved quality, and decided that an international exhibition should be held in Berlin in October, 1914.—*Automobil-Welt*, July 13.

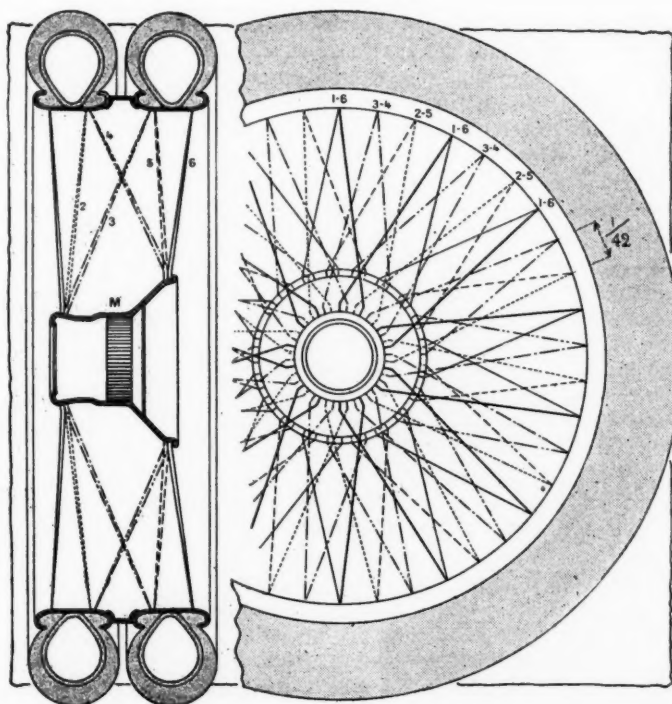


Fig. 3—Lacing of spokes in twin wire wheels

Vulcan Enters Field with Two Models

Touring Car and Speedster To Be Fitted on Same Chassis—Four-Cylinder Block Motor in Unit Three-Point Power Plant

THE medium-priced car field has been entered by the Vulcan Manufacturing Co., Painesville, O., which will market one chassis model fitted with a five-passenger touring body and a two-passenger speedster body. The former is to sell at \$850 with complete equipment and the latter at \$750 similarly equipped, the same chassis being used in each except for the difference in wheelbase and heavier rear springs for the touring car.

The Vulcan chassis is a unit motor clutch and gearset design supported on a three-point suspension system with propeller shaft inclosed in a torque tube with ball and socket support at the forward end on the rear of the gearbox, this torque tube transmitting the driving power of the rear axle to the chassis proper.

The motor is a four-cylinder, block L-head type with $3\frac{3}{8}$ -inch bore and 5-inch stroke, giving a S.A.E. horsepower rating of 18.21 and a piston displacement of 178.9 cubic inches. The leather-faced cone clutch is located within the flywheel and both are entirely inclosed. The gearset is a three-speed selective one.

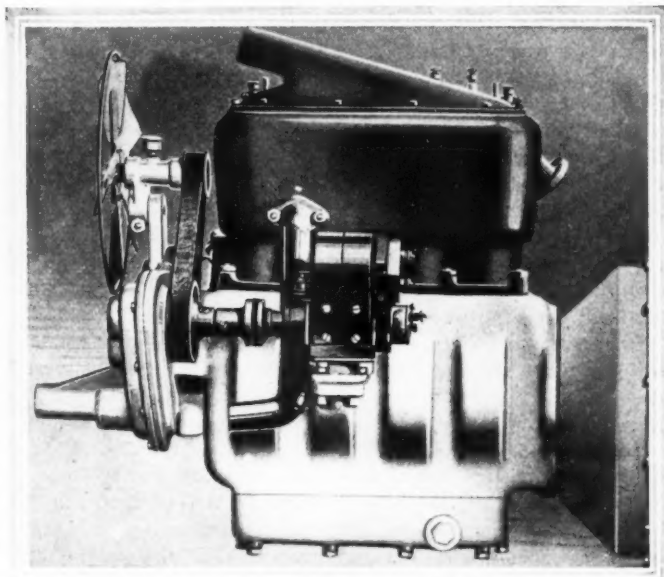
Tubular Front Axle Used

On the touring car the wheelbase measures 115 inches and on the speedster it is 105. On this car 32 by 3.5-inch tires are used all around. The front axle is of tubular construction, the rear being a semi-floating design; three-quarter elliptic rear springs are used and the frame is a conventional pressed steel type.

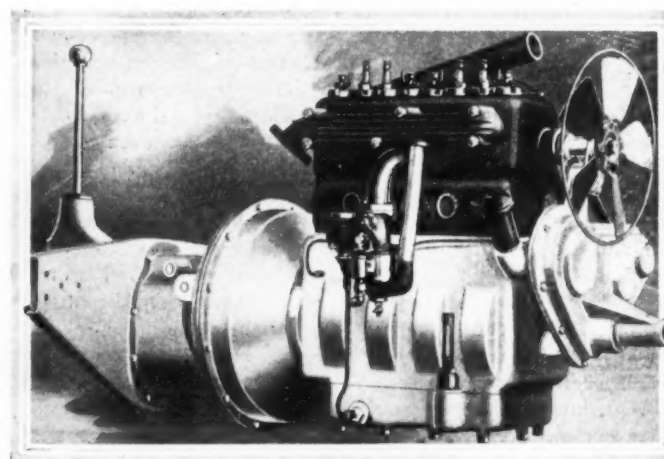
The touring car complete weighs 1,750 pounds, its equipment including gas headlights, Prest-O-Lite tank with gauge, oil side and tail lights, mohair top with side curtains, automatic windshield, horn, speedometer, tools and tire repair kit.

The unit power plant is a particularly compact, clean-cut job, the block cylinder casting incorporating the intake manifold. The crankcase size is restricted somewhat by the use of crescent-shaped extensions at each side to accommodate the lower ends of the connecting rods without making the complete case wide enough for this work. Cover plates inclose the complete valve mechanism. The crankcase proper carries at its rear a bell-shaped end which, together with a corresponding forward end on the gearbox, forms a covering for the flywheel and cone clutch. It is customary in many unit power plants with three-point suspension to have the single points of support in front and the two points in rear of the gearset, or in some at points at either side of the flywheel. In the Vulcan the single support is in front beneath the forward parts of the motor and the two points midway of the gearbox, which is accomplished by a pressed steel member entirely embracing the gearbox and secured to it by flanges, as illustrated.

Still another interesting detail of the Vulcan unit power plant is that the front half of the housing for the ball and socket support of the torque tube is cast integrally with the rear of the gearbox, so that the driving strain from the rear axle is transmitted direct from the torque tube to the gearbox and thence to the frame through the large cross-member which forms the two points of support for the unit power plant. This gives a



Left side of the Vulcan motor, showing mounting of magneto and novel location of water intake connection on cylinder jacket



Vulcan unit power plant, showing clean design of motor and mounting of gearshaft lever

particularly clean frame construction, there being but three cross-members required, one at the radiator, one at the gearbox and the other at the rear end.

Returning to the motor: The crankshaft, a two-bearing one, is a heavy forging with its main bearings $1\frac{7}{8}$ inches in diameter and that at the flywheel $5\frac{1}{2}$ inches long. At this end there is a large integral flange to which the flywheel bolts. The camshaft is a large-diameter forging fitted with integral cam with surfaces ground after case-hardening. Spur timing gears are used.

Ignition is a single high-tension magneto system without dry batteries or storage battery.

Cooling is by the thermo-syphon system, assisted by a 12-inch fan, which is belt-driven from the magneto shaft, the pulley for the drive being in the rear of the timing gear housing. Provision for fan belt adjustment is included.

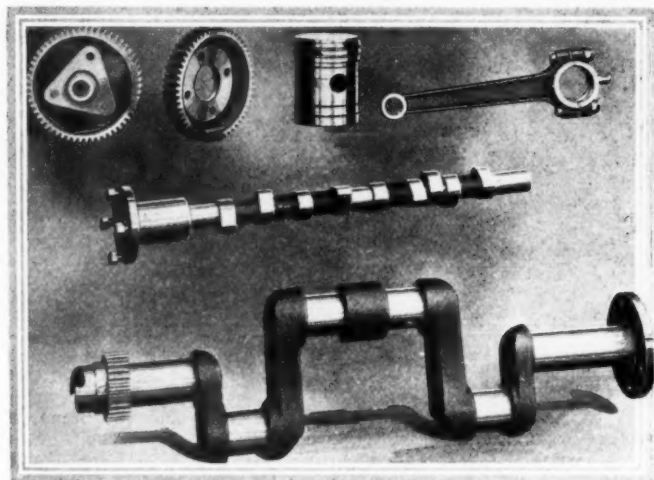
The motor lubrication system is a circulating splash type with a 6-quart oil reservoir in the base of the crankcase. The plunger

pump for circulating the oil delivers its supply to the crankshaft bearing, whence the splash level is supplied. On the crankcase is a float indicator for the reservoir.

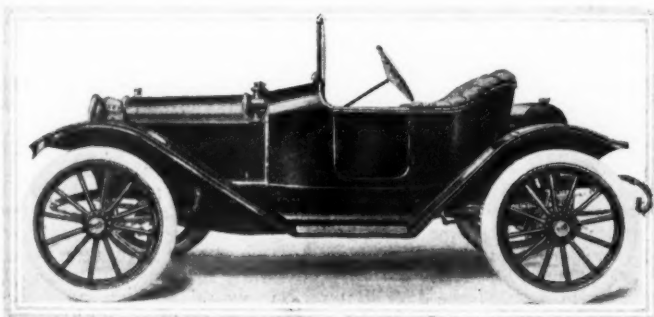
A 1-inch carbureter is fitted and takes its supply of hot air from around the exhaust manifold.

The leather-faced cone clutch is made with 13-inch diameter and 1½-inch face. Engagement is through a set of eight springs which press against the aluminum cone at one end and the pressed steel spider at the other. The clutch pedal is provided with roller bearings which engage a deep groove in the clutch cone hub. The clutch cone is mounted on ball bearings.

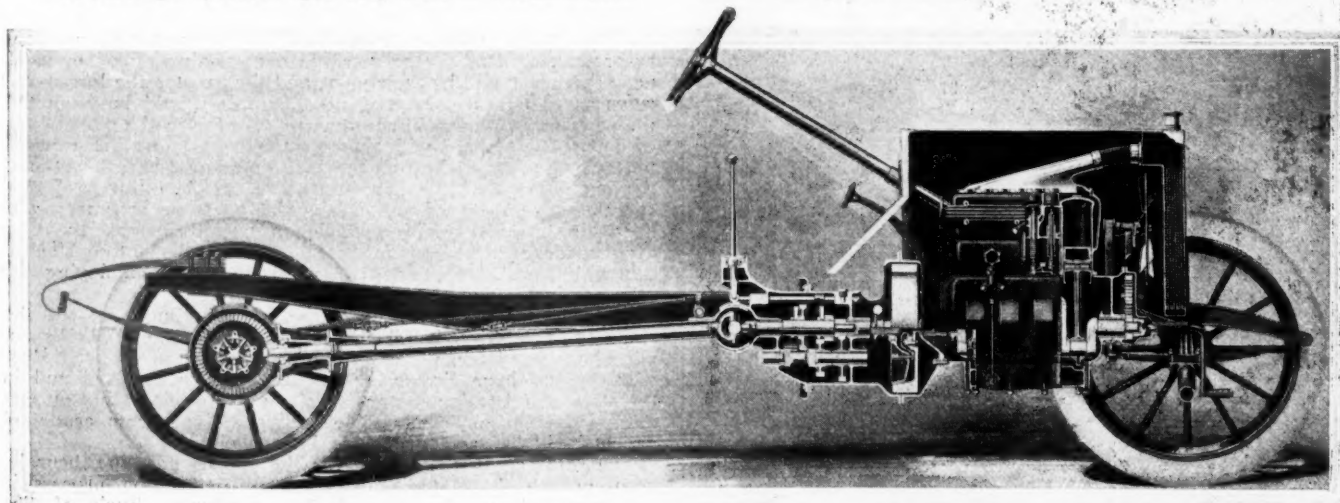
The selective gearset, affording three forward variations, is a vertical design with the main shaft on top. Gears are 3½ per cent. nickel steel with wide faces ranging from ¾ to 1⅝ inches.



Timing gears, piston, connecting-rod, camshaft and two-bearing crankshaft, which are used in the new Vulcan four-cylinder touring car and speedster



Two-passenger speedster type body fitted to Vulcan chassis



Cross-sectional view through Vulcan chassis, showing light but strong and compact construction employed

The teeth of the sliding gears are chamfered to facilitate engagement. Gearshifting is through a cane-handle type of lever with a ball end. It is mounted on the rear of the gearbox and is set in a ball and socket, below which is the H gate cast into the gearbox housing.

But one universal is used in the propeller shaft, its location being directly beneath the gearshaft lever and within the ball and socket support for the forward end of the torque tube, which ball and socket forms a grease-tight housing for it.

In the semi-floating rear axle the car weight is carried on ball bearings mounted on the tubular housing. Both pinion and bevel are made from 3½ per cent. nickel steel. The differential is a five-pinion bevel type, the pinions being bronze bushed and carried in a forged spider. The axle drive shafts are 1 3/16 inches in diameter. The differential is carried on ball bearings 4 1/16 inches in diameter.

The usual internal and external brakes are located on the rear wheel. They are asbestos faced.

The steering gear is a rack and pinion type, the column being inclined at a rakish angle and carries a 16-inch wheel.

Front springs are semi-elliptic and the rears three-quarters elliptic, the latter 44 inches long and with leaves 1¼ inches wide. Spring eyes are bushed with Tobin bronze and the bolts are ground to size and provided with grease cups.

The Vulcan company, which is manufacturing this car from parts made in its own factory, has the following officers: President, F. H. Murray; vice-president, R. G. Ewell; treasurer, E. W. Hartwell, and directors, H. E. Hammer, J. G. Ward, W. Truby, E. E. Lawrence and W. H. Becker. The factory is located in Painesville, O.

Marion Announces 1914 Six

INDIANAPOLIS, IND., Aug. 18—Announcement has just been made of the 1914 Marion car, known as Marion Six, two models G5 and G2 of which will be marketed on the same chassis. These models are a five-passenger touring car and a two-passenger roadster, respectively. The wheelbase is 124 inches, tread standard and tires are 35 by 4.5 inches. The motor is a L-head type, consisting of two three-cylinder block castings with large water jackets. The bore is 3.75 and the stroke 5.25 inches; the crankshaft is carried on large bearings lubricated by a combination splash and force-feed system. A Westinghouse electric starter is geared directly to the front end of the crankshaft. Dry-disk clutch, transmission in unit with the axle and Sheffield steel springs—semi-elliptic in front and three-quarter-elliptic in the rear—are used. In regard to original details the Marion car is rich, and among the new features mention should be made of the supplanting of grease cups by hollow bolts which contain the grease themselves.

G. C. Vaporizer Shows Good Exhaust Test

New Device Uses Kerosene or Heavier Distillates Without Trouble—Fuel Consumption Is the Same as Gasoline

Now Carrying on Tests with Trucks in Actual Service Here and Abroad—Fuels of .865 Density Used

NEW YORK CITY, Aug. 18—Final figures on the test of the G. C. vaporizer recently conducted in this city, show that in fuel consumption and exhaust analysis that good results are obtained with the device. In fact when it is considered that there are many truck owners who are hesitating over their service on account of the apparent high cost of operation with gasoline as a fuel, the success of a device of this kind gives hope that at least for truck work a solution of the problem is in view.

The accompanying tables show that the pounds of fuel per horsepower-hour with gasoline and carburetor is about the same as for kerosene and the G. C. vaporizer. Kerosene costs about half what is charged for gasoline and hence the fuel cost is cut in half. The exhaust gas analysis shows a good thermal efficiency and the motor exhibited but trifling carbon deposit.

Even with kerosene, the fuel as it enters the cylinders of the motor, mixed with air is in the form of a perfect gas. There is no recondensation in the manifolds and no other vaporizing device needed. The air is taken in through the mixing valve shown in the illustration at the top of this page. The following tabulations show the results of the test, using Pierce-Arrow motor, six-cylinder, 4.5 by 5.5 inches.

With Gasoline and Carburetor

R.P.M.	B.H.P.	Pounds per horsepower per hour
1543	65.5	.81
1653	56.4	.98

Exhaust Analysis			
CO ₂	CO	O ₂	
9.8	3.6	0.1	
7.4	3.2	4.3	

Kerosene with the G. C. Vaporizer

R.P.M.	B.H.P.	Pounds per horsepower per hour
1144	54.1	.78
1692	70.8	.805
695	34.4	.94

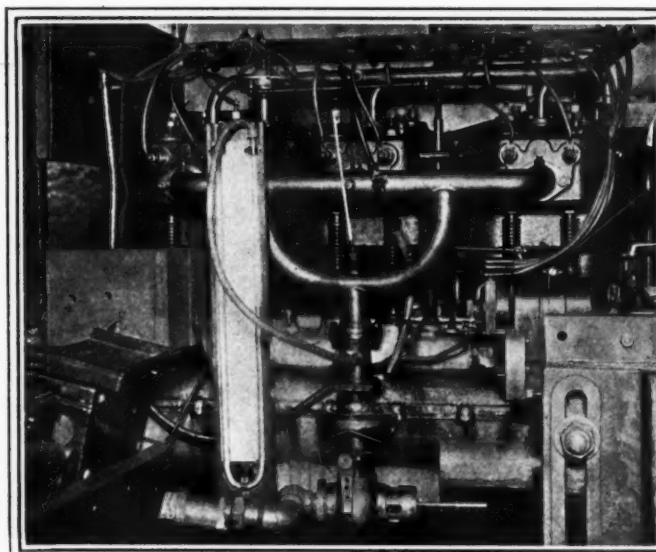
Exhaust Analysis			
CO ₂	CO	O ₂	
12	0.6	0.4	
10.2	0.8	2.8	

Straight Run Distillate with the G. C. Vaporizer

R.P.M.	B.H.P.	Pounds per horsepower per hour
1536	61.6	.82
1015	45.4	.76
756	33.1	1.17

Refined Pine Wood Spirits

R.P.M.	B.H.P.	Pounds per horsepower per hour
1506	67.3	.835
1119	52.7	.86
710	35.9	.902
456	24.1	.94
336	17.3	.8



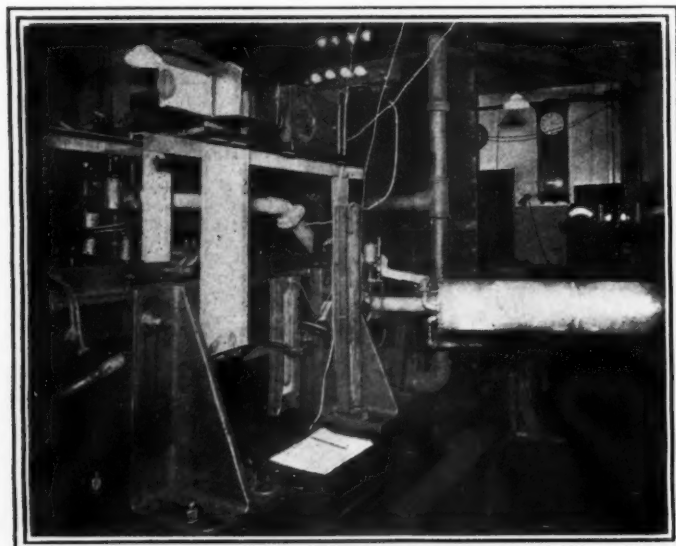
Intake side of motor, showing mixing valve

A brief resumé of the history of gasoline and the numerous unsuccessful attempts that have been made to replace it, shows the solution of the fuel problem is not so much a matter of substitution as it is a demand for the development of a practical mechanical method or means of using a much larger proportion (say 60 to 70 per cent.) of the crude oil.

The proportion of gasoline in the crude oils is relatively small and even by stretching a point, not more than 10 per cent. of all crude oils obtained, can be counted on for gasoline. The result is that from the world's production of about 50,000,000 tons of crude oil annually, only about 5,000,000 tons of gasoline can be obtained. With over 1,000,000 automobiles in use in America alone and something like 500,000 marine engines and an almost incalculable number of stationary engines using gasoline with the certainty that the number will increase tremendously each year from now on, it is impossible to predict the limit to the demand for gasoline. On the other hand it is fairly easy to figure the amount that can be produced. This means that in a few years no gasoline will be available for the new motors. It might be said that the discovery of new sources of crude oil would save the day, but when this is thought over, it can be readily seen that this possibility is somewhat remote, to say nothing of the fact that no one would be justified in refining this crude oil to get the 10 per cent. gasoline without being sure of finding a buyer for the other 90 per cent. Here is the point of the matter—the buyer of gasoline will always be obliged to pay for the 100 per cent. of the crude product less the money the producer of gasoline obtains for the 90 per cent. by-products. Now the greater the over-production of by-products, the lower will be their price and the greater the loss to the refiners. Therefore, even if new sources should be exploited, the price of gasoline will continue to rise, for in the 90 per cent. of by-products there will always remain 40 to 60 per cent. in the same family as kerosene, which could not be sold even if the exploitation of the new sources of crude oil were forced for the production of gasoline. The question becomes: why does this abnormal situation which continues to increase the price of gasoline exist? The answer is evident—the automobile industry has failed to find a practical means of employing the other derivatives of the crude oil.

The G. C. apparatus permits the use of almost all the derivations of the crude oil and has the advantage of being applicable to any internal combustion engine now in service. Regular services have already been established in England and in the streets of London motor vehicles are now operating on any one of the various combustible liquids derived from crude oil which distill before 600 degrees Fahrenheit.

The same apparatus serves for the use of gasoline, benzole, kerosene, distillates, alcohol, etc.; and no refining process is necessary before using any of these products. Fuels of .865 density have been used in this device with success.



Motor on block, showing G. C. vaporizer in background

Wahl Offers Choice of Two Bodies

**New Model Has Standard Features of Design
Including Unit Power Plant and Long Stroke**

THE Wahl Motor Co., Detroit, Mich., is offering to the public a new car which is of especial interest, due to features incorporated in a design which is to be sold at an almost sensationally low figure. Two body designs are furnished for the one standard chassis, a two-passenger roadster and a five-passenger touring car. The expression "standard chassis" may be interpreted in two ways, first in the usual manufacturing sense, and second, in regard to the entire absence of any radical or experimental features about the whole car.

The power plant follows the practice of placing the motor, clutch and gearset in a unit. The four cylinders are cast in pairs and have a bore of 3.25 inches. A stroke of 5.5 inches gives the motor an honest claim to belonging to the long-stroke class, since the stroke-bore ratio is 1.692. The maker does not quote a horsepower rating, claiming that these ratings have been so often misstated that they have lost their value. Applying the S. A. E. formula, it is 16.92 horsepower. Considering the piston displacement of 182.5 cubic inches in the light of recent investigations of long-stroke motors it is safe to assume that this engine will develop about 19 horsepower at 1,000 feet per minute piston travel, and about 24 horsepower at 1,400 revolutions per minute.

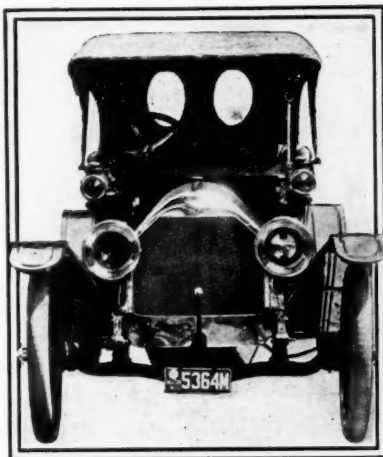
The three-bearing crankshaft and other moving motor parts are lubricated by a splash system in which the oil level is kept constant by a pump.

The clutch is of the multiple-disk type with plates 9 inches in diameter and covered with Raybestos. The driver's left foot operates the lever for disengaging the clutch and the service brake pedal is to the right. The gears for the three forward speeds are shifted by a cane handle lever in the center of the floorboard. Next to this lever is a second one for applying the emergency brakes. This center control with the steering gear placed on the right side gives very easy access to the driver's seat from either side of the car. The throttle lever is placed above the 17-inch steering wheel and is interconnected with an accelerator placed between the other two pedals. A dash lever for controlling the air valve on the Model "H," Holley carbureter completes the control elements, since, for the sake of simplicity of operation, the Bosch high-tension magneto is given a fixed timing.

Thermo-syphon circulation is used. The radiator is V-shaped. The 108-inch wheelbase allows for a body of sufficient length to give plenty of leg room in both compartments, and further permits making all the doors full size without the corners cut off in order to clear the fenders.

A double drop is made in the frame to allow for easy entrance to the body and to keep the center of gravity low. The side rails of the frame are also swept at the dash.

Hyatt bearings are incorporated in a Salisbury semi-floating rear axle. Both the service and emergency brakes act on 12-inch drums. Between the frame and axles are semi-elliptic springs in the front, and elliptics in the rear. To the 32-inch



Front view of touring body

wood wheels are fitted 3 1-2-inch tires on quick-detachable rims.

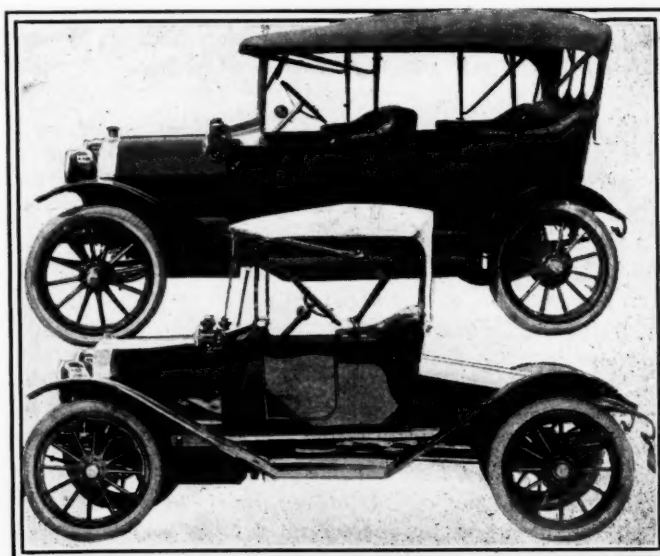
The standard equipment on this car is very complete. It includes a mohair top, top envelope, Prest-O-Lite tank, gas headlights, oil side and tail lamps, speedometer and windshield of special design. Besides these there are the horn, repair kits, and other necessities for the care and operation of the car.

Maudslay Trucks for 1914

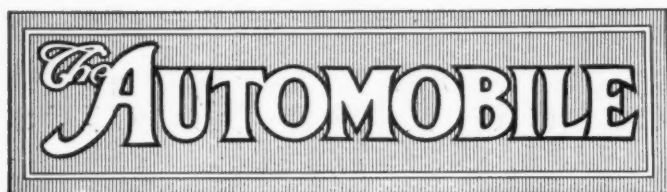
The Maudslay 3 and 5-ton vehicles are numbered among the few commercial types using valve-in-the-head motors, although there is considerable sentiment in favor of this type because of the increased efficiency that can be obtained by the use of the spherical combustion chamber which this

valve arrangement permits of. In these engines the cylinders are cast in pairs with the camshaft lying along the cylinder heads and worm driven from a vertical shaft positioned at the right front. The feature of these engines is the crankcase construction, which is made specially deep and with large inspection plates at each side so as to permit of the removal of the connecting rods and pistons without dismounting the cylinders from the case or in any way interfering with the overhead camshaft or the valve mechanisms. This operation is impossible with motors having the ordinary side camshaft position.

A feature of these vehicles is the twelve-jet carbureter. Closing the throttle covers these jets in by a sliding saddle device. As the throttle is opened it slides along bringing the jets into operation. Detachable cast steel wheels are used on all models.



Side views of touring and runabout bodies with tops up



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The Accessible Car

WITH the improvement of the various component parts entering into the automobile for 1914 there is no reason for mounting these parts less accessibly solely because they are considered more trouble-proof.

Accessibility is one of the major requirements and yet the 1913 model was not up to par, largely because of the added parts, such as the generator for electric current and motor for self-starting. For next year, these parts are grouped more as integrals of the motor, and to do so some have rendered them highly inaccessible. If they chance to give trouble, and have to be removed, it will be a half day's work to remove and re-install, although the actual repair may only occupy 30 minutes.

Some automobile engineers are not living in the proper atmosphere of car design. They drive cars, but never have to repair them. At night they are run into a garage and if the next morning they are not in shape, some handy man around the factory may spend half the forenoon getting them back again. If that engineer had to do the repairing himself and also do his regular day's work he would have the greatest lesson in accessibility he ever received. He would see the car as the owner sees it. He would see the car as something that can be repaired speedily and where the money spent largely goes for the repair, rather than 90 per cent. going for lack of accessibility and the remaining 10 per cent. for work and materials.

Owners Owe Tires Care

A GERMAN scientist, as the result of nearly 2 years of experimentation with pneumatic tires and spring suspension for automobiles, ends his efforts with the remark, "The pneumatic tire must be made to permit of greater flexion in the side walls." Further than this he goes not but leaves it to the inventive genius of the brains of the tire world to work out the details of accomplishment.

The greater flexion is considered necessary by Herr Bobeth, who conducted the investigation, in order to give a rational riding car. His conclusions are based on the fact that when our present design of tire is inflated to the recommended pressure the vibration is too intense, particularly when riding over hard rough pavements, and he recommends a lower inflation pressure for such use.

From first consideration of Herr Bobeth's conclusions it would seem possible to meet his requirements for flexion by under-inflation but this, on second thought, becomes impossible in that often a day's trip lies over a dozen types of roads.

It is true that the two extremes in tire wear are very common, namely, running a car with the tire under-inflated and running it with over-inflation.

One is exceedingly bad for the tire, the other equally strenuous for the car.

The under-inflated tire is attractive, it permits of easier riding and often the cost of it does not appear gradually but comes as an avalanche—when the tire is ready for the discard, then, and only then, does the driver see the error of his way. The over-inflated tire subjects the car to an unnecessary amount of vibration, which, with a thinner side-wall construction, if such is possible, will naturally do much to improve such a condition.

Viewing the subject from the tire viewpoint only, it is apparent that under-inflation is to be strenuously guarded against, because of the increased flexion and the consequent heat generated. The higher the inflation, the less the flexion of the side-wall fabrics and consequently the less heat generated. Reducing the flexion friction seems the almost impossible task imposed on the tire inventor and for the moment a higher grade of fabric would seem a possible solution, in that it would reduce the amount of material in the side wall and the heat of flexion would be correspondingly reduced.

Car owners and drivers can do much to improve tire service by giving better and more frequent attention to tire inflation. The owner and driver err as frequently at under-inflation as at over-inflation. If tires are to be kept at correct inflation then they must be frequently tested. Pressures of 80 pounds have been known to drop to 50 inside of a week, without a puncture.

The dangers of over-inflation must be guarded against in hot weather. If the tire has a regular inflation recommended pressure of 90 pounds and the air is put in at a cool garage it is not unusual for this pressure to rise to 105 pounds by the middle of a hot afternoon. With smaller tire sizes increases of 10 pounds in pressure are about the average, this depending on the temperature of the original air. Tire repairmen are often hopelessly inconsistent. In one city a pressure of 90 pounds for hot and cold is recommended; in another city the recommended pressure is 85 in summer and 95 in winter.

Many Companies Take Up the Cyclecar

Numerous Automobile Manufacturing Experts Perfect Plans To Supply a New Market Opening in This Country

DETROIT, MICH., Aug. 18—Definite news of the enormous activity going on in Detroit in the cyclecar field has been hard to get for the last 2 weeks, due to the fact that every company working on these little cars has been too busy perfecting its plans to have time to give anything out to the public. Probably the most significant point covering the situation is that the light car development has arrested the attention of men and firms of established reputations in the automobile industry here and that they are taking a hand in the work. In three cases it is known that prominent engineers have been retained by new cyclecar companies in an advisory capacity and in two other cases firms of consulting engineers have been commissioned to develop designs and experimental models for well-known companies who do not wish their identities disclosed at present. Although the mentioning of names has been forbidden in the above instances, a number of new points have come to light which are given under the headings below.

American Cyclecar Co.

Definite information has just come out concerning the future plans of the American Cyclecar Co., which was incorporated in Michigan early in the year and has since been working very quietly on experimental models. The first cars were designed and built under the supervision of the Herman Engineering Works and have been on the road for some time.

The comparatively small organization which was financing the preliminary work has been absorbed by the Connecticut Electric Manufacturing Co., Bridgeport, Conn. The capital stock of the cyclecar company has been increased from \$1,000 to \$200,000 and plans looking to \$500,000 working capital are being made.

The two cars, which have been on the road for several weeks, are equipped with four-cylinder, water-cooled motors of 2.875-inch bore and 4-inch stroke. They are designed to carry two passengers side by side and plenty of leg room has been provided for. These cars have 80-inch wheel bases and 44-inch treads. When equipped with the lights, a windshield, top and tools, the machines are to sell for \$390.

Princess Cyclecar Co.

Aside from the American Cyclecar Co. and the two concerns who have gone to the point of taking factory space, the Princess Cyclecar Co., with a suite of offices located at 1311 Dime Savings Bank Building, seems to have perfected its plans about the farthest. A two-passenger model will be made the leader, although a four-passenger car and light delivery van will be built upon the same chassis. The whole design has a decided foreign effect, which is not surprising when it is learned that one of the engineers responsible for it is C. J. Thornehill, who has recently come to this country from England where he has been connected with the Wolseley-Sideley and the Thornehill Bros. companies.

The features of greatest interest about the Little Princess, as the car is called, are the air-cooled motor and the gearless differential. The motor design calls for block cylinders with the inlet and exhaust manifolds cast integrally. A bore of 2.5 inches and a stroke of 3.875 inches will give it a piston displacement of 92 cubic inches or about 1,500 cubic centimeters, which brings it outside of the English cyclecar definition of 1,100 cubic

centimeters. The fan is incorporated in the flywheel. Details of the differential are being guarded, but it is stated that it will not contain the usual bevel and spur gear but will be incorporated in the wheel hub.

The gearset is a planetary type with two speeds forward and a reverse from which the drive is carried to the rear axle shafts by a shaft and bevel gears. The spring suspension includes semi-elliptic in front and a semi-transverse spring in the rear. Other specifications are: Tubular front axle, two sets of brakes, 28 by 3-inch tires on wire wheels, 44-inch tread and 86-inch wheel base. The weight is below 620 pounds.

A word can be added concerning the stream-line body, which is of metal along the lines shown. It is planned to make an important change from these in the use of fenders following around the curve of the wheels, instead of the tangent type shown. This is already an English practice and will be more in harmony with the other body lines.

First deliveries will be made on February 1, 1914, at a list price of \$375.

Detroit Cyclecar Co.

Probably the latest comer in the field is the concern which is being promoted by A. R. Thomas, 510 Free Press Building. Although the formation of the company under the name of The Detroit Cyclecar Co. has not been completed, the preliminary designs and complete estimates are out. These call for a four-cylinder motor of 2.75-inch bore and 4-inch stroke which will not only be used for this car but will be manufactured also for the open market, according to the present plans. Again a displacement of approximately 95 cubic inches puts the car outside the definition and in common with all the other so-called cyclecars announced in Detroit it really belongs to the light-car class as it is known in Europe. Another feature which departs radically from the popular conception of the cyclecar is the use of wood wheels. Two body designs have been evolved, both for two passengers only. The one that is expected to be the most popular is along racing car lines, without a cowl and with bucket seats. This has full fenders and sells for \$375. The other lists at \$475 is of the protected type with very sweeping stream lines. A very original and pleasing effect is produced by a radiator whose lines converge at a blunt point in the center in which the headlight is incorporated. The more orthodox features of the design are a two-speed and reverse gearset, shaft drive, 48-inch tread and 92-inch wheelbase. The weight is estimated at 700 pounds.

American Voiturette Co.

About a week ago it became known in real estate circles that the American Voiturette Co. has leased the former Brush runabout plant at Euclid avenue and the Grand Trunk Railroad from the Maxwell Motor Co. Since taking possession, men have been busy on a job similar to one of the famous tasks assigned to Hercules, for the plant has been vacant for some time. The work of clearing and repairing is now completed and everything is ready for installing the machinery. Shipments of axles have arrived and other parts are on the way which will be made up at once into agents' demonstrating cars.

Sterling Motor Co.

W. C. Little, who has severed his active connection with the Chevrolet Motor Co. to take control of the Sterling Motor Co. states that he is going to be among the first in this country to manufacture small motors for the cyclecar market. Mr. Little is not ready as yet to announce the details of the new product other than that it will be of the four-cylinder, water-cooled class. The Sterling plant at Flint is being removed to Detroit where its regular line will also be continued as well.

Many Stars Entered for Elgin Races

**DePalma, Mulford, Dawson, Bergdoll,
Anderson, Haupt, Rickenbacher and
Bill Endicott Among Those To Race**

Several Other Entries Are in Sight—

Patterson May Nominate Mortimer Roberts

CHICAGO, ILL., Aug. 19—Entries to the fourth annual Elgin road races close Friday, but already there are listed enough stars to insure the success of the classics. The list fails to show as many cars as in previous years, but this is accounted for by the fact that this time there are only two races scheduled as against five last year and also by the fact that American manufacturers are not very keen over competitions this year.

Still, with such stars as Ralph DePalma, Ralph Mulford, Harry Grant, Joe Dawson, Erwin Bergdoll, Gil Anderson, Willie Haupt, Hughie Hughes, Ed. Rickenbacher and Bill Endicott listed, it would seem as if the motor enthusiasts of the Middle West ought to get their money's worth Friday and Saturday.

There is considerable disappointment over the scratching of the Mercedes entries by E. C. Patterson, the Chicago sportsman who entered Pilette at Indianapolis. Before Pilette sailed for home he signed up with Patterson and also agreed to bring over Hemery. He cabled soon after that he could not find Hemery and then to cap the climax, he sent another cable last week, stating that owing to a severe illness he could not come to Elgin. Patterson cabled back to send the car anyway and that he would find a driver, but this message Pilette ignored altogether. Now Patterson is figuring on nominating Mortimer Roberts with the Roberts Special for the first day's race, his effort to get Earl Cooper and the Stutz having failed because the Pacific coast star intends driving at Corona, Cal., September 9.

As the entry list stood up to noon today it showed:

First Day, August 29.

For cars 300 inches and under, 301 miles; for the Chicago Automobile Club trophy, formerly the Cobe cup:

Car	Driver	Car	Driver
Mason	Ralph Mulford	Mercer	Spencer Wishart
Mason	E. Rickenbacher	Nyberg	W. Madden
Mercer	Ralph DePalma		

Elgin National Trophy.

For cars 450 inches and under, 301 miles; for the Elgin National trophy:

Car	Driver	Car	Driver
Mason	Willie Haupt	Mercer	Spencer Wishart
Mason	E. Rickenbacher	Stutz	Gil Anderson
Isotta	Harry Grant	Erwin Special	Erwin Bergdoll
Marmon	Joe Dawson	Tulsa	Hughie Hughes
Mercer	Ralph DePalma	Case	Bill Endicott

There still are several other good prospects. If Mulford is able to get his Peugeot in shape he is expected to declare for the second day. He is waiting for parts from France. Several local Marmon owners are putting their heads together to put in a Marmon on the first day and have Bruce Keene drive it. A couple of Ohio entries are in sight, while a local Velie owner is figuring on going in. Henry Nyberg also wants to drop in a six-cylinder the second day.

CHICAGO, ILL., Aug. 20—*Special Telegram*—Bob Burman in the Keeton is one of the latest additions to the entry list for the second day of the Elgin races. Harry Endicott in the Nyberg is also entered for the first day as is also Joe Dawson in the Deltal. Another Deltal is entered for the second day, the driver's name not being given.

CINCINNATI, O., Aug. 18.—The first race meet promoted by the Cincinnati Automobile Club will be held at the Latonia, Ky., race track on September 13. The proceeds will go towards de-

fraying the expenses of the orphans' outing. The Chamber of Commerce and other civic organizations have become interested and already cash prizes amounting to over \$3,000 and trophies valued at over \$1,000 have been put up. There will be a 5-mile event, a 10-mile event, a 25-mile event and a 100-mile race. The winner of the last named will receive \$1,000 and a silver trophy.

Fast Time at Libertyville

CHICAGO, Aug. 17—The second half of the Libertyville dirt track meet, postponed from a week ago because of rain, was run off today before a large crowd. Fast time was made, honors being divided among the Case, Mason and Mercer. The feature was the third and deciding heat of the 10-mile race for 600 cubic inch cars and was remarkable for the bitter fight between Disbrow in the Simplex Zip and Rickenbacher in the Mason. The former won in 9:18.2, but Rickenbacher gave him a fight, stirring the crowd to enthusiasm by the manner in which he battled with Disbrow on the turns. On the straights the Zip pulled away, but the Mason driver took the turns without shutting off, making up lost ground there. The summary follows:

10 MILES, 301 INCHES AND UNDER

Car	Driver	Time
Mercer....C.	W. Luttrell...	10:45
Case.....E.	Hearne.....	..
Mercer.....F.	C. Wilbur....	..

5 MILES, 450 INCHES AND UNDER

Mason.....E.	Rickenbacher	5:06.08
Mason.....	Chandler .....	..
Case.....	Bill Endicott....	..

1-MILE TIME TRIALS

Simplex Zip.L.	Disbrow.....	0:53
Mason.....	Rickenbacher ..	0:54
Case.....	Bill Endicott....	0:55
Jay-Eye-Sec.	Disbrow	0:56

5-MILE TIME TRIAL FOR STATE RECORD

Car	Driver	Time
Simplex Zip.L.	Disbrow	4:33.6
Former record.....		4:58.6

AUSTRALIAN PURSUIT RACE, WON IN 9 MILES

Case.....	Bill Endicott....	9:06.2
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10 MILES, CARS 600 INCHES AND UNDER

Simplex Zip.L.	Disbrow	9:18.2
Mason.....E.	Rickenbacher
Case.....B.	Endicott.....	..

5-MILE FREE-FOR-ALL

Simplex Zip.L.	Disbrow.....	4:53.8
Case.....B.	Endicott.....	..
Mason.....E.	Rickenbacher ..	..

Wolverines Hold Sociability Run

DETROIT, MICH., Aug. 19—The Wolverine Automobile Club carried out the third of its sociability tours on August 17. The trip covered 125 miles of excellent road. The party made their mid-day stop at Evans Lake.

The gala day for Detroit orphans has been set for August 28. T. P. Beard, A. R. Miller and W. B. Bachman are busy seeing that the youngsters will have plenty to eat. It is expected that the Detroit Automobile Dealers' Association and the Detroit Automobile Club will join hands with the W. A. C. to make this one of the happiest occasions of the kind ever attempted here. The long procession will pass through the city parts on the way to Belle Isle, where the youngsters will receive more ice cream, candy and other good things than will probably be good for them.

Two Desert Races for November

PHOENIX, ARIZ., Aug. 16—Phoenix will be the objective point of two great desert road races held early next November, during the week of the annual state fair. One will be from El Paso and the other from Los Angeles, by way of San Diego.

The Los Angeles and San Diego races have been combined and the event will be run over the same course as was used in 1911. Last year there was a disagreement and San Diego was cut off, after which she decided to have a race of her own.

It is expected that about \$7,000 will be available in prizes for the Los Angeles-Phoenix race. Barney Oldfield, Teddy Tetzlaff, Earl Cooper and other great drivers will pilot cars over the course. Ralph Hamlin, who drove a Franklin to victory last year, still declares that he is through with the racing game forever.

The race will start at midnight, November 1, and those that are still in the running will go into control at Yuma the next afternoon. Monday afternoon, November 3, the race will finish at the fair grounds.

In all probability the El Paso race will start at the same time. The night control will be at Bisbee or Douglas, Arizona. The course is just 510 miles long, through Tucson and Florence, and all cars must finish in 28 hours running time to be officially checked in. It is claimed that the prizes will total \$5,500. Phoenix, Douglas, Bisbee, Tucson, Florence, Mesa and other towns along the route are contributing. Ten cars are already entered, and it is believed that twenty-five will make the race.

John DePalma Wins at White Plains

WHITE PLAINS, N. Y., Aug. 16—John DePalma, brother of the well-known Ralph, won three out of five events in a Mercer at the automobile races here today. He took the prize in a 5-mile Class E event (7:24), in a 10-mile Class D free-for-all (13:27.5), and a free-for-all handicap of 10 miles (13.11), having a start of 30 seconds over Wishart's Mercer, which scratched and finished second. Wishart took a 5-mile Class E race (6:37), DePalma being second. The remaining event was taken by Jean Meneghetti in a Fiat Toronto car, the race being for the Auto Aero Cup. The winner's time for the 1-mile trial was 1:14.5.

Philadelphia To Have 2-Mile Oval Speedway

Refusal of Fairmount Park Commissioners To Reinstate Racing Has Raised Track Construction Question

Will Cost Approximately \$500,000 and Will
Be Built in Vicinity of Willow Grove

PHILADELPHIA, PA., Aug. 16—There is a strong probability that in the near future Philadelphia will possess an automobile race track of sufficient size to stage not only local contests but a yearly international meet or two, the latter proposition not being beyond the range of possibilities should present arrangement be carried out, and there is every reason to believe they will be.

With the refusal of the Fairmount Park Commissioners to reinstate racing in the park and the conversion of the old Point Breeze 1-mile track into an amusement park, there has been no place where an automobile meet could be staged, the consequence being that Philadelphia, so far as racing is concerned, has been a desert waste, it having been over one year since any have been held here.

The proposition is being fostered by residents of the Old York Road and towns immediately adjoining Philadelphia in conjunction with a number of Philadelphia motorists.

Tentative plans provide for a 2-mile oval speedway to be constructed of reinforced concrete or brick, 60 feet wide on the turns, the approximate cost being \$500,000. The project will be financed by a system of life membership fees ranging from \$250 to \$2,000, it being expected to secure sufficient of these to carry it through.

No definite location has been chosen, but it is likely to be in the vicinity of Willow Grove, a point easily accessible from all parts of this and other towns.

Restrains New York Taxi Ordinance

NEW YORK CITY, Aug. 20—Justice Seabury of the Supreme Court today vacated the temporary injunction obtained by the Yellow Taxicab Co., and the Waldorf-Astoria Hotel Co., the Universal Taximeter Co., Mason-Seamon Transportation Co., Taxicab & Auto Co., Motor Taximeter Co., 47th St. Taxicab Co., Garden Taxi Co., Hotel Astor and the Hillard Hotel Co., restraining the Mayor and the commissioner of license from putting into effect the new public hack ordinance. Justice Seabury in his opinion said the ordinance was not hastily adopted but only after careful and thorough examination and investigation of the whole matter.

Graduated Taxation in Ohio

CLEVELAND, O., Aug. 17—At a meeting of the Ohio State Automobile Association in the rooms of the Cleveland Automobile Club yesterday, it was decided to fight the new automobile license law to come into effect the first of next year.

The new law passed by the legislature last winter provides for a substantial increase in the license fees over the present schedule. Up to this year the annual state license fee has been \$3 for electrics and \$5 for gasoline cars. The new schedule is on a graduated basis ranging from a minimum of \$5 for cars under 20 horsepower to \$18 for the higher-powered vehicles. Three attorneys have been retained by the State Association to

arrange a test case, and it is hoped that this can be taken directly into the Supreme Court.

The general feeling of objection among Ohio automobilists is not solely because of the increase in amount of the new fees, but because the bulk of the revenue is to be used for general state purposes and the remainder only for road improvements. At present all the revenue except collecting expenses goes to the improvement of roads, and there has therefore been no legitimate cause for objection. It was pointed out that by the new law a less actual amount of revenue will be available by the highway department for road work than formerly.

The present scale of license tax brings in a state revenue of over \$500,000. By the new rate this revenue is likely to be almost doubled.

Mid-Summer Show for Milwaukee

MILWAUKEE, WIS., Aug. 18—The first real effort to hold a mid-summer motor show in Milwaukee is being made by the Wisconsin State Board of Agriculture, which has decided to make a distinct division or department for the motor industry and set aside the mammoth Machinery Hall building for a motor show which will be part of the annual Wisconsin State Fair, September 8 to 12. Space is being allotted by J. C. McKenzie, secretary, until September 1, after which date the operation will be in charge of Jacob Dietrich, superintendent of machinery. September 9 has been set aside as "Manufacturers' and Dealers' Day," and a special program of entertainment will be given on Motor Row, as the street passing Machinery Hall in the immense state fair grounds is now known. In previous years there has always been a generous display of motor vehicles at the Wisconsin State Fair, but not until now has the motor-car been placed in a department all its own.

Big Registration in Wisconsin

MADISON, WIS., Aug. 16—On August 15 the secretary of state had issued 32,682 motor car licenses, and applications are coming in at the rate of 50 to 75 per day. The wonderful increase in the number of motor cars owned in Wisconsin may be seen from the following figures compiled from the time motor cars were first licensed:

July 1, 1905 to Jan. 1, 1906...	1,492	1910	15,831
1906	2,666	1911	21,986
1907	4,147	1912	24,578
1908	6,192	To Aug. 15, 1913.....	32,682
1909	9,832		

Ohio Claims Second Registration Place

COLUMBUS, O., Aug. 18—State Registrar of Automobiles Shearer of Ohio is authority for the statement that Ohio is the second state in the Union in the number of motor vehicles registered. When the 80,000 mark was passed in Ohio, he wrote to the registrars of other states to ascertain their number of licenses. He found that New York had 117,509 vehicles registered; Ohio, 80,375; Illinois, 79,439, and Pennsylvania, 71,419. California, with a nominal registration of 112,129, counts all cars that have ever been registered in the state and also counts hundreds of tourists' machines which have been temporarily listed in the state.

Callan Accident Law Constitutional

NEW YORK CITY, Aug. 17—That provision of the Callan law, of a driver causing an accident having to give name, address and number before leaving, has been held to be constitutional by a recent decision of the N. Y. Court of Appeals. The point raised by the defense, that requiring a driver to give such information violated the provision of the state constitution that no person shall be compelled in any criminal case to be a witness against himself, in the case of *The People vs. Edward Rosenheimer* was held to be invalid.

Chicago Orphans' Outing for 2,000

CHICAGO, Aug. 16.—The annual orphans' day outing this time conducted by the Chicago Orphans' Day Outing Association, made up of the Chicago Automobile Club, Chicago Motor Club, Chicago Automobile Trade Association, Chicago Garage Owners' Association and the Electric Vehicle Association of America, was held Thursday. More than 2,000 children were given a ride, and then there were not enough cars, for it rained in the morning, and 100 who had promised cars did not report. The affair took the shape of a luncheon at Garfield park first, then a ride to Jackson park, on the south side, where the trip ended.

MILWAUKEE, WIS., Aug. 18.—The annual orphans' outing of the Milwaukee Automobile Club will take place Thursday, August 21. Five hundred orphans from five asylums will be entertained with a ride around the boulevard system to Washington Park, where a picnic dinner will be served at noon. Forty Milwaukee business houses who regularly contribute supplies toward the outing, have again offered donations. This will be the sixth annual outing. Probably no other event on the Milwaukee Automobile Club's calendar attracts so much genuine interest as this because of the fine sentiment attached to it.

Klaxon Company Files Suit Against New York Firm

A. Elliott Ranney Co., Dealer in Hudson Cars Defendant in Suit Restraining It From Using Sparton Horn as Standard Equipment

NEW YORK CITY, Aug. 20—Suit was filed in the Federal Court, Southern District of New York, on August 16, 1913, by Lovell-McConnell Manufacturing Co., Newark, N. J., makers of the Klaxon, Klaxonet and Klaxet warning signals, against the A. Elliott Ranney Co., of 1700 Broadway, New York City, praying an injunction, profits and damages for infringement of their basic patents Nos. 923,048, 923,049 and 923,122, granted May 25, 1909.

These same patents are in issue in the infringement suit against the Newtone horn which was heard by Judge Chatfield in Brooklyn, on May 19, 20 and 21 last, on which decision has not yet been handed down. The present suit is against a motor-driven horn called the Sparton, made by the Sparks-Withington Co., of Jackson, Mich., and sold by the defendant as part of its regular standard equipment for the 1914 model Hudson car made by the Hudson Motor Car Co., of Detroit, Mich.

As pointed out by Mr. Lovell, president of the complainant company: "The principal damage in cases of this kind is done by the salesman in demonstrating and praising the infringing horn as one of his talking points in selling his car. What a car seller says is especially damaging because his attitude is naturally that of disinterested intermediary who is not trying to sell the horn. Moreover, the inquirers he talks to are practically all prospective horn users and his demonstrations of the infringing horn outnumber his car sales about twenty to one. To prevent this damage is more important to us than the considerable profits which might be recovered in case the horn could be proved to be the decisive factor in effecting sale of the car. While the vast majority of car sellers understand the damaged reputation that may result from offering a cheap infringing article as an important and conspicuous accessory of a high-priced and presumably high grade car, there are a few of them who do not, and these we expect to have enjoined."

Attachment Against Bidwell Continued

BUFFALO, N. Y., Aug. 20—*Special Telegram*—The case of James A. Benture, of the Northland Rubber Co., who recently sued Alfred C. Bidwell, president of the International Automobile League and once of the Northland company, for \$100,000 for libel, has entered in a new stage. The plaintiff has recently secured a writ of attachment which has now been continued by Judge Woodward. This continuation of the attachment against the money and realty property of Bidwell caused stipulation to be entered into between the counsels for the parties vacating the order of arrest secured by Benture against Bidwell.

Company Bankrupt in Sandusky

CINCINNATI, O., Aug. 18—The Union Savings Bank & Trust Co. of this city has taken possession of the plant and property of the Sandusky O., Auto Parts & Motor Truck Co. An officer of the local company is now in charge of the affairs of the up state concern. According to a statement issued by General Manager Storms the embarrassment of the Sandusky concern is due to the recent failure of the Michigan Buggy Co., of Kalamazoo, its largest and best customer. Property and cash to the extent of \$150,000 are tied up as the result of the Michigan failure, says Storms, with a capital stock of \$500,000,

\$314,000 of which has been paid in the Sandusky Auto Parts & Motor Truck Co., which was incorporated about 3 years ago. The plant with its 200 employees will be kept in operation and a reorganization may be brought about.

Chicago Bank Sues Michigan Buggy

GRAND RAPIDS, MICH., Aug. 18.—Following the appointment of the Detroit Trust Co. as receiver for the Michigan Buggy Co., of Kalamazoo, manufacturers of the "Mighty Michigan" car, suit has been begun in the U. S. Court here by the Continental & Commercial National Bank, Chicago, against M. Henry Lane, Frank B. Lay and Victor Palmer, officers of the company, for damages not to exceed \$150,000. A second petition in bankruptcy has been filed against the company by the W. T. Richards company, the Jefferson Park National Bank and Walter F. Lewis, all of Chicago.

Duplex Wagon Now in Shape

CHARLOTTE, MICH., Aug. 18.—An expert engineer has been engaged to help out with the affairs of the Duplex Power Wagon Co. and the factory undoubtedly will soon be running full blast. The company is now free from all litigation. As soon as the necessary parts can be obtained the plant will be started up at capacity, manufacturing the new sliding transmission gear truck.

R-C-H Creditors to Meet August 20

DETROIT, MICH., Aug. 18.—The Security Trust Co., of Detroit, which is acting as receiver for the R-C-H Corp., has called a meeting of the corporation's creditors for Wednesday, August 20. At this meeting the results of the inventory will be made known.

BOSTON, MASS., Aug. 18.—The Boston Chamber of Commerce has begun a campaign by which it hopes to diminish the number of motor car accidents in the city streets of Boston and vicinity. For this purpose it has prepared a large poster for distribution in garages, motor clubs and other places where motorists and chauffeurs cannot help but see them. The poster pictures a number of typical causes of motor car accidents, in many of which street cars also are concerned.

Co-Receiver for Walpole Mentioned

BOSTON, MASS., Aug. 16.—Judge Dodge, in the U. S. District Court here, has again put over the question of appointing an additional receiver to work with Robert C. Fisher, recently appointed receiver for the Walpole Tire & Rubber Co., of Waltham, Mass., that figured in financial troubles following the closing of a bank in Providence. The judge had given the creditors an opportunity to select some person to act, and there was a meeting last Thursday at New York to go over the case, but it did not produce results. Judge Dodge stated that if one-third of the creditors who desire to have a co-receiver appointed could recommend to him some one person who would not be antagonistic to Mr. Fischer, and also agreeable to the stockholders of the company he would appoint a co-receiver. Attorney Morris told the judge that at the meeting in New York creditors representing claims of a value of \$914,670 adopted a resolution opposing the appointment of a co-receiver. This was divided as follows: Against a co-receiver, \$631,870 claims; for a co-receiver, \$282,800. Judge Dodge stated that the minority creditors should be protected as well as the majority, and that the stockholders should also have their rights protected, inasmuch as the company is generally conceded to be solvent. He said that it seemed to him that the court should take such action as would satisfy the one-third and not give the two-thirds an advantage.

Attorney Sears, appearing in the interest of some of the stockholders, stated that he had heard that a movement was under way on the part of a rival tire company to get control of the Walpole company, either to close it down or run it as an adjunct of its own plant. Attorney Metzler, representing the corporation, corroborated Mr. Sears as to these rumors being afloat. Attorney Lee Friedman, in making a report of what Receiver Fischer had been doing during the last week, stated that he had about \$40,000 in cash and had done about \$60,000 worth of business. The question will come up again next Saturday.

Great Western Company Calls Creditors' Meeting

Company Wants Additional Time from Creditors and Is Planning for Additional Indianapolis Capital

INDIANAPOLIS, IND., Aug. 18—A meeting of creditors of the Great Western Automobile Co., Peru, Ind., has been called for the purpose of arranging for an extension.

The company, owing to lack of orders during the past few months, is in a position where it will be necessary either to secure additional time from its creditors or discontinue business. A strong effort is being made by the principal creditors to put through a plan by which additional local capital will be secured and the company put on its feet in good shape.

There are said to be about thirty complete cars and parts sufficient for 100 more on hand, and if time is given to make up and market same, funds will be in hand to take care of the greater part of the current liabilities. So far as is known most of the creditors are agreeable to the proposed plan, and it is likely that the production of cars will be continued.

DETROIT, MICH., Aug. 13—*Special Telegram*—It is reported that one of the new additions to the Ford plant, 80 by 100 feet, will be used exclusively for the manufacture of wire wheels. The Zenith Carbureter Co. is moving into the factory on the Belt Line, which it purchased from the Armstrong Woolen Co. The Cutting motor car sale will be held at Jackson on August 19, unless the court postpones it again, when the bankruptcy petition is heard Saturday.

Detroit Makers Unite for Hospital

DETROIT, MICH., Aug. 19—As an outgrowth of the Employers' Liability Act, which has been in effect in Michigan this past year, and the scarcity of hospital facilities in Detroit, eighteen manufacturing concerns here have banded together to form the Manufacturers' Mutual Hospital Association. The association has taken a 5-year lease of the Eaton homestead, at 484 Jefferson avenue, and is equipping it for hospital purposes. The house will provide for twenty-four beds, doctors' and directors' rooms, and operating room and a general reception room. It is said that about \$25,000 a year will be spent in maintaining the institution, which will be ready for the formal opening September 1.

Of those connected with the automobile industry, the following names appear among the companies organized:

Detroit Screw Works, Morgan & Wright, Ireland & Matthews, Detroit Gear & Machine Co., Michigan Steel Castings Co., King Motor Car Co. and Michigan Bolt & Nut Works. It is also understood that the Chalmers Motor Car Co. and several Fairview concerns will join the association in the near future.

Program of Trade Press Convention

NEW YORK CITY, Aug. 19—The program of the Trade Press Convention, to be held here on September 18-20, has just been given out. The first morning will deal with the discussion of "Business Promotion through Trade Press Efficiency." The address of welcome of H. M. Wilson, president of the N. Y. Trade Press Association, will be replied to by President H. M. Swetland, of the Federation of Trade Press Associations. Various trade press association heads will then speak. Then editors will speak on the problems facing the trade and technical press, while during the afternoon the circulation question will be taken up. Three big meetings will be held on Friday the 19th; every

phase of advertising will be talked about in the first, the development of trade press business will be told by leading representatives of the profession, while a number of inspiring addresses on different departments of the trade press situation will be dealt with in the afternoon. The annual banquet will be held in the north ballroom of Hotel Astor in the evening. The questions touching upon policies and ideals of the trade press will be taken up at the Symposium held on Saturday, September 20, 9.30 a. m. Many prominent speakers of all departments of trade-pressdom have decided to speak at the meetings, and it is to be expected that many very interesting facts will be brought out.

Kansas Convention for October

KANSAS CITY, Kan., Aug. 18.—At the second annual convention of the Kansas State Automobile Association, to be held at Hutchinson, Kan., October 7 and 8, plans are being made for a race program that promises to be interesting. If the present plans are carried out, the big race track of the Hutchinson Fair Association will be used to conduct the races. The track is half a mile long. Races, if they are given, will be under the rules of the A. A. A.

At the convention needed legislation will be discussed. It will be attended by A. G. Batchelder, president of the A. A. A., by officers of the various Kansas good roads associations, officers of the Nebraska Automobile Association and good roads advocates generally in the section. Action will be taken looking toward the solid backing of the 78 county organizations of any proposed legislation approved by the convention.

To Pave Long Stretch of Ohio Road

COLUMBUS, O., Aug. 18.—The announcement has been made by Governor Cox and State Highway Commissioner Marker of Ohio to the effect that contracts for the paving of the old National Road from Columbus to the eastern border of the state would be awarded in October. The entire stretch of road will be paved in brick, roadway being 18 feet in width. The money for the improvement comes from the federal government, the state road fund and from the various counties through which the road passes.

COLUMBUS, O., Aug. 18.—The commission named by Governor Cox of Ohio to revise the road laws of the state met recently and organized by electing Arch H. Huston, of Columbus, chairman, and J. W. Smith, of Ottawa, counsel. The commission will take up the work at once.

Arizona May Issue Road Bonds

PHOENIX, ARIZ., Aug. 16.—Sentiment for the issuance of road bonds is rapidly spreading in Arizona. A movement is well under way for the initiation of an amendment to the constitution which will permit the issuance of state bonds. Initiative petitions are being circulated by the various auto clubs and highway associations, by county supervisors, legislators and other persons. The amendment will be submitted to the people in November, 1914, and if it is approved a road bond issue of several million dollars will be voted on.

Apache county has just issued \$30,000 worth of bonds for highway improvement and the money is being expended under the direction of W. A. Crossland, an engineer sent out by the government office of public roads. Yuma county will soon vote on an issue of either \$300,000 or \$500,000.

Brick Pavers' Meeting To Be Held

CLEVELAND, O., Aug. 18.—On September 17 and 18 the National Paving Brick Manufacturers' Association will hold its tenth annual meeting here. Road construction will be among the topics to be discussed, and the guests will be taken over the brick-paved roads around Cleveland.

Phoenix Pumps Gave Short Measure

PHOENIX, ARIZ., Aug. 16.—W. P. Mealey, city inspector of weights and measures, has discovered that practically all the gasoline pumps in Phoenix have been delivering short measure. The shortage ran from 3 pints to 3 quarts for each 5 gallons. Under the inspector's direction, the machines were readjusted.

Dodges Leave Ford

To Manufacture Automobiles of Same Type Named for Themselves

DETROIT, MICH., Aug. 19—It is now stated that after July 1, 1914, the date on which their present contract for the manufacture of Ford parts will expire, the Dodge Bros., of this city, will enter the field with a light car of a similar type to the Ford, but possibly selling at a little higher price. It cannot be learned at present whether it will carry a four or a six-cylinder motor.

The Dodge Bros. plant is now located on Joseph Campau avenue and for the past 2 years they have been acquiring 2,100 feet of adjacent property on Bismarck street. Their present plant is one of the largest and most modern in Detroit. A new assembling unit, 900 feet long, will be built at once to give about 20 acres additional floor space. Estimates place the additional number of men that will find employment in these two plants at from 8,000 to 20,000. The smaller number is probably a good conservative estimate.

Pope Cuts Price—To Make Sixes Only

HARTFORD, CONN., Aug. 18—Sixes exclusively is the manufacturing program announced by the Pope Mfg. Co. for 1914. The company announces also that stock on hand purchased for 1914 four-cylinder cars will be made into automobiles and that the small four which sold in 1913 for \$2,250 will be passed out at \$1,650. The drop in price, which amounts to about 26 per cent., has caused something of a stir in the local market. That only sixes will be featured is a matter of surprise in view of the acknowledged capability of the big four which had been the 1913 leader.

HARTFORD, CONN., Aug. 18—Consistent with the recently established policy of conservative operation, The Pope Manufacturing Co. has announced the abandonment and offering for sale of the west works, so called, formerly the Pope tube works. The explanation given out is that the recently completed concrete, brick and steel addition to the main plant on Capitol avenue is adequate for all manufacturing demands at this time. The west works have been used for the assembly of motor trucks. All this work will be done in future at the main plant. It has been ascertained that the work of assembling the Pope trucks could be more advantageously done at the main than at the isolated plant. The west works were built previous to 1900 in the balmy bicycle days for the manufacture of tubes for Pope bicycles. The plant eventually passed to the United States Steel Corp. and remained idle for a number of years until it again passed into Pope control.

Buy Searchlight Plant for \$175,000

CHICAGO, ILL., Aug. 19—The receiver's sale of the assets of the Searchlight Gas Co. was held at Warren, O., on August 14, and the Searchlight Protective Committee purchased the property for \$175,000. As the Protective Committee represents over 90 per cent. of both the Searchlight creditors and the Searchlight stockholders, its purchase of the assets assures the reorganization of the company and the continuance of manufacture, though no plans will be announced for a reorganization until after the court confirms the sale. The committee consists of Charles Minshall, Terre Haute, Ind., John F. Craddock and John S. Rountree, both of Chicago. H. B. Pearson is the receiver.

To Sell Flanders Plants September 8-9

DETROIT, MICH., Aug. 18—At the time of the closing of the Flanders plants at Pontiac and Chelsea, Mich., the Harris Bros. of Detroit bought the equipment and took options on the prop-

erties. Due to the fact that the Federal Court can not sell real estate at private sale these properties will be offered at public sale on September 8 and 9. This sale is a formality to give a clear title to the real estate and it is understood that the properties will be bid in by the Harris Brothers. About the same time the Studebaker Corp., Inc., bought the Plant E, to be used for the manufacture of gears, and later acquired another one of this group formerly known as the Vulcan Gear Plant, which they now call Plant 15, in which has been established a complete service factory. The remaining properties at Pontiac will be sold on September 8 and the Chelsea properties on the following day.

Thomas Buys Back His Plant

BUFFALO, N. Y., Aug. 18—Edwin Thomas, formerly identified with the E. R. Thomas Motor Co., has purchased the building at 1192 Niagara street and is converting it into a plant for the manufacturing of light automobiles. The building, as is well known, is especially fitted for this purpose and the Thomas Six was manufactured here for many years. Mr. Thomas is willing to rent this property to various parties who will use it for light manufacturing of automobiles.

DETROIT, MICH., Aug. 18—George A. Gemmer, who retired from his active duties with the Gemmer Manufacturing Co. about a year ago, has developed a motor starter using compressed air as the source of energy. A \$200,000 company to market the device has just been incorporated under the name of the Gemmer-Detroit Starter Co. L. W. Smith is associated with Mr. Gemmer in the new concern.

ROCHESTER, N. Y., Aug. 18—R. W. Lytle, formerly with the Vellie Motor Vehicle Co., Moline, Ill., later factory manager of the Locomotive Foundry & Machine Co., Williamsport, Pa., has been appointed factory manager of the Hazard Motor Mfg. Co., Rochester, N. Y.

Ewing Not To Go to St. Thomas

ST. THOMAS, ONT., Aug. 18—Following an unusually critical meeting of ratepayers, when a provisional agreement entered into between the Ewing Motor Truck Co. and the City Council for the removal of the company's plant from Findlay, O., to St. Thomas in return for the city guaranteeing \$125,000 bonds of the company, E. L. Ewing, head of the concern, sent a communication Monday to Mayor Price of St. Thomas notifying him of the withdrawal of the proposition. A by-law was to have been voted on tomorrow by the ratepayers, some of whom attacked the proposal on the ground that security, consisting of the plant and machinery valued at \$200,000, but which Mr. Ewing admits having bought from receivers for \$75,000 was insufficient. A resolution was passed with only a few dissenting votes that the Council be asked to withdraw the by-law, but the action of Mr. Ewing, head of the Findlay plant, forestalled this action.

Southern Classification Lowers Rates

NEW YORK, Aug. 19—The general traffic department of the Automobile Chamber of Commerce published a statement on August 15, referring to a reduction in rates on automobile chassis and open bodied trucks, sent in carloads, under the southern classification.

A meeting held on July 7 decided that the following indexing will be contained in a forthcoming supplement of the southern classification:

Vehicles, self-propelled automobiles, or other self-propelled vehicles, not otherwise indexed by name—

Chassis or open-bodied trucks:
S. U., loose, minimum weight, 2,500 lbs. each, L. C. L.D1
S. U., in boxes or crates, actual weight, L. C. L.D1
K. D., in boxes or crates, actual weight, L. C. L.1½
S. U. or K. D., straight or mixed C. L., or in mixed C. L. with axles, frames, radiators, engine or gear parts, wheels or wheel rims or channels, minimum weight, 11,000 lbs.2
Other than chassis or open-bodied trucks:
S. U., loose, minimum weight, 2,500 lbs. each, L. C. L.D1
S. U., in boxes or crates, actual weight, L. C. L.D1
K. D., in boxes or crates, actual weight, L. C. L.1½
S. L. or K. D., straight or mixed C. L., or in mixed C. L. with axles, chassis, bodies, tops, radiators, engine or gear parts, wheels or wheel rims or channels, minimum weight, 10,000 lbs.1

The effect of this change will be: Freight rates one class lower than at present on carloads of chassis or open-bodied trucks; a lower charge for 11,000 lbs. in 36-ft. car than now charged on 10,000 lbs.; a lower charge for 13,750 lbs. in 40-ft. car than now charged on 12,500 lbs.; a lower charge for 19,800 lbs. in 50-ft. car than now charged on 18,000 lbs.; the privilege of shipping engine or gear parts and wheel rims or channels in carload lots of either passenger or freight machines as part of the carload, instead of being subject to additional L. C. L. charges.

Shipments of open-bodied trucks in cars containing passenger machines should be avoided after the above ratings are published, as the Committee has failed to provide for such mixture at the carload rate, and the less carload rate on each machine will therefore apply. We now have this matter up for correction.

Buys Cutting Plant

Banker Acquires Entire Property —Company Will Be Reorgan- ized—1914 Car Already Planned

JACKSON, MICH., Aug. 19—*Special Telegram*—At the sale of the property of the Cutting Motor Car Co. today, W. M. Thompson, president of the Jackson City Bank of this city, outbid all others actively contesting on the entire property, by offering the sum of \$30,000 in cash and agreeing to assume two mortgages, one on real estate valued at \$15,000 with accrued interest of about \$250 and the other on land contracts to the amount of \$9,000 with accrued interest. In addition there is a mechanics' lien of \$4,990 which is considered as doubtful. There were about twenty automobile manufacturing firms, private individuals and other interested parties reported. The sale was conducted by the receivers, the Detroit Security Trust Co., of Detroit.

The property was offered first in bulk, then in parcels and finally in bulk again. No bids were made at first on the property in bulk and some of the offers on parcels came slowly, the only active bidding being on the property as a whole on the last offering.

Without doubt the company will be reorganized in the near future and as a 1914 car has already been planned, the factory will undoubtedly commence operations in a few weeks as most of the heads of the departments are waiting for the call. It is reported locally that the plans are being made to manufacture a small car at a popular price. Creditors express themselves

as pleased with the price brought at the sale as many expected to realize a smaller per cent.

It is the opinion of the purchaser of the property that the price will be confirmed by Judge Sessions of the Grand Rapids district court, who is acting in the absence of Judge Tuthill from the Detroit District Court, as referee in the case.

Seek Control of Mais Company

INDIANAPOLIS, IND., Aug. 18—A number of leading business men of Columbus, Ind., headed by M. Q. Reeves, are negotiating for a controlling interest in the Mais Motor Truck Co., now located in Indianapolis.

If the deal is consummated, the plant will be removed to Columbus, Ind., and local parties will have active management.

The Mais company reports a considerable increased volume of business during the past 3 months and with proper facilities for manufacturing, believe a heavy business can be done.

Boston Truck Show to Open March 7

BOSTON, MASS., Aug. 18—The announcement of the Automobile Board of Trade relative to the motor shows in New York and Chicago in January and February cancelling the truck section leaves Boston as the only city of the big three that will hold a truck show. At the last meeting of the directors of the Boston Automobile Dealers' Association and the Boston Commercial Vehicle Dealers' Association it was decided to hold a truck show next year. The pleasure car show will take place beginning Saturday evening, March 7, and the truck show will begin the following Tuesday evening, Monday being needed to get all the motor cars out as no work is allowed on Sunday. Chester I. Campbell will manage both shows again.

No More Garden Exhibitions

NEW YORK CITY, Aug. 17—In all probability the Madison Square Garden had its last automobile show during the past winter, and there is very little chance that it will ever again hold one. Both the A. C. of C. and the M. & A. M. exhibits will be stationed at the Palace in 1914 and probably at all later shows as well.

Automobile Securities Quotations

There were few changes in automobile stock prices, and they were apparently more due to the influence of trading itself than to information about the companies. Goodyear common fell 20 points, Pope preferred 10 and Swinehart 4, while Consolidated common rose 8, Miller 3, Willys-Overland common 3 1-2 and General Motors 4 1-2 points.

	1912		1913	
	Bid	Asked	Bid	Asked
Ajax-Grieb Rubber Co., com.	145	165	150	170
Ajax-Grieb Rubber Co., pfd.	95	100	95	100
Aluminum Castings, pfd.	99	102	97	100
American Locomotive Co., com.	45 3/4	46 3/4	32 3/4	33 3/4
American Locomotive Co., pfd.	109	110	101	102
Chalmers Motor Company, com.	..	..	102	110
Chalmers Motor Company, pfd.	..	..	95	102
Consolidated Rubber Tire Co., com.	16	18	23	35
Consolidated Rubber Tire Co., pfd.	50	60	80	90
Firestone Tire & Rubber Co., com.	283	290	270	280
Firestone Tire & Rubber Co., pfd.	106	108	103	105
Garford Company, preferred.	99	101	92	96
General Motors Company, com.	36 3/4	36 3/4	39	40
General Motors Company, pfd.	79	79 1/2	80	81
B. F. Goodrich Company, com.	77	77 1/2	29 3/4	30 1/2
B. F. Goodrich Company, pfd.	107 1/4	108 1/4	90 1/2	91 1/4
Goodyear Tire & Rubber Co., com.	330	334	275	285
Goodyear Tire & Rubber Co., pfd.	105	107	98 1/2	99 1/2
Hayes Manufacturing Company	..	97	..	..
International Motor Co., com.	27 1/2	28 1/2	..	5
International Motor Co., pfd.	84	85	10	18
Lozier Motor Company, com.	..	..	16	..
Lozier Motor Company, pfd.	..	..	90	..
Maxwell Motor Co., com.	..	..	4	5
Maxwell Motor Co., 1st pfd.	..	..	33	35
Maxwell Motor Co., 2nd pfd.	..	..	9 1/2	10
Miller Rubber Company	142	150	132	138
Packard Motor Company, pfd.	105	107	..	99
Peerless Motor Company, com.	..	..	30	40
Peerless Motor Company, pfd.	..	..	85	92
Pope Manufacturing Company, com.	39	40	9	11
Pope Manufacturing Company, pfd.	74	75	28	32
Portage Rubber Co., com.	..	..	35	45
Portage Rubber Co., pfd.	..	..	..	90
Reo Motor Truck Company	9 3/4	10 1/4	..	11
Reo Motor Car Company	22	24	..	48
Rubber Goods Mfg. Co., pfd.	..	..	102	106
Studebaker Company, com.	44	45	22 1/2	25
Studebaker Company, pfd.	95	96	80	86
Swinehart Tire Company	95	97	84	87
U. S. Rubber Co., com.	100	105	61	62
U. S. Rubber Co., 1st pfd.	107	110	105	105 1/2
White Company, preferred.	107 1/2	..	104	108
Willys-Overland Co., com.	..	..	62 1/2	63 1/2
Willys-Overland Co., pfd.	..	..	85	90

Market Changes of the Week

There were few important changes in this week's markets, the largest being in cottonseed oil, when it rose to \$8.94, a gain of \$1.04. Tin was easier and quiet in the domestic market as well as at London, and although the London limits were lower on future positions there was very little outlet here as offerings on American account were considerably lower for shipments from either the Straits or London. The small demand brought the prices down to \$41.38, a loss of \$1.17 per 100 pounds. Lead rose \$20 per 100 pounds, closing at \$4.75. Both Lake and electrolytic coppers experienced raises in price of \$.00 1-8 per pound. Automobile scrap rubber retains a steady tone. Consumers continue to purchase sparingly as a rule, but stocks are not increasing. Tire scrap is now calling at \$.09 1-2 per pound. There was no material change in the situation in the leading crude rubber markets of the world yesterday. The easier tone which developed in the English market on the previous day was still in evidence and again the tendency of prices was downward.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Change
Antimony, lb.	.07 1/2	.07 1/2	.07 1/2	.07 1/2	.07 1/2	.07 3/4	..
Beams & Channels, 100 lbs.	1.61	1.61	1.61	1.61	1.61	1.61	..
Bessemer Steel, ton	27.00	27.00	27.00	27.00	27.00	27.00	..
Copper, Elec., lb.	.15 3/4	.15 3/4	.15 3/4	.15 3/4	.15 3/4	.15 3/4	+.00 1/2
Copper, Lake, lb.	.15 3/4	.15 3/4	.15 3/4	.15 3/4	.15 3/4	.15 3/4	+.00 1/2
Cottonseed Oil, lb.	7.90	8.25	8.50	8.91	8.95	8.94	+1.04
Cyanide Potash, lb.	.19	.19	.19	.19	.19	.19	..
Fish Oil, Menhaden Brown	.33	.33	.33	.33	.33	.33	..
Gasoline, Auto, 200 gals.	.22 1/4	.22 1/4	.22 1/4	.22 1/4	.22 1/4	.22 1/4	..
Lard Oil, prime	.95	.95	.95	.95	.95	.95	..
Lead, 100 lbs.	4.55	4.55	4.55	4.75	4.75	4.75	+.20
Linseed Oil	.52	.52	.53	.53	.53	.53	..
Open-Hearth Steel, ton	27.00	27.00	27.00	27.00	27.00	27.00	..
Petroleum, bbl., Kansas crude	.98	.98	.98	.98	.98	.98	..
Petroleum, bbl., Pa., crude	2.50	2.50	2.50	2.50	2.50	2.50	..
Rapeseed Oil, refined	.68	.68	.68	.68	.68	.68	..
Silk, raw Italy	5.10	..	..	..	5.20	5.15	+.05
Silk, raw Japan	4.05	..	..	..	4.13	4.13	+.08
Sulphuric Acid, 60 Baume	.90	.90	.90	.90	.90	.90	..
Tin, 100 lb.	41.55	41.55	41.50	41.40	41.50	41.38	+.17
Tire, Scrap	.08 1/2	.09 1/2	.09 1/2	.09 1/2	.09 1/2	.09 1/2	..

Factory Miscellany

KEETON Plant Taking Inventory—The Keeton Motor Car Co., Detroit, Mich., which has recently announced some changes in its management, has closed its plant for 2 weeks for the purpose of taking inventory. H. H. Newsome has just been made general manager. In the rearrangement of the Keeton company's executive affairs, Mr. Keeton will be relieved by Mr. Newsome of many of his past duties as vice-president. This will give him a chance to devote more time to the Keeton Motors, Ltd., of Brantford, Canada, of which company he is the president.

Purchases New Battery Plant—The Manhattan Electrical Supply Co. has purchased the business and plant of the Rock Island Battery Co., of Cincinnati, O.

In New Shop Building—The Harvey Spring Co., Racine, Wis., motor car and vehicle springs, has taken occupancy of its new shop building, 50 x 150 feet, which will enable it to materially increase its production.

To Manufacture Motor Trucks—J. Geo. Wagner, of Detroit, Mich., is forming a \$400,000 company, to be known as the Aetna Motor Truck Co. The product of the new concern will be in the 1 1-2-ton class, with an overload capacity of 25 per cent.

Aluminum Goods Co. Adds—The Aluminum Goods Mfg. Co., which operates two large plants at Manitowoc, Wis., and Two Rivers, Wis., is making extensive additions to both works. A complete rolling mill is being added at Two Rivers and at Manitowoc; the foundry and casting shops are being doubled in size.

Faultless Rubber Purchase Land—The Faultless Rubber Co., of Ashland, O., has purchased from Fred Hayes a considerable tract of land adjoining its plant upon which several large additions to the plant will be erected. R. W. Miller has been elected president and Charles Campbell general manager for the coming year.

Tractor Co. Wants Plant—A motor tractor company, capitalized at \$100,000, is negotiating with the Business Men's Association of Eau Claire, Wis., for a location of a plant. The company asks a local investment of about \$50,000. Its products are being manufactured under contract with several machine shops and foundries in the Middle West at this time.

American Voiturette Moves—Wm. G. Houck, formerly sales director of the Keeton Motor Co., Detroit, Mich., has leased the former Brush Runabout plant No. 2 from the Maxwell Motor Co. The American Voiturette Co., of which Mr. Houck is the moving spirit, is now installed in this plant at the corner of Euclid avenue and the Grand Trunk Railroad.

Hall Increased Plant—John Hall, Jr., formerly of Boston, Mass., and who resigned some time ago from the painting department of the Stevens Duryea Co., Chicopee, Mass., to start a body painting plant with William Mitchell, has recently bought out Mr. Mitchell's interest and he has awarded a contract for a new building at Springfield, Mass., where he plans a big business.

Oshkosh Pneumatic Hub Builds—The Oshkosh Pneumatic Hub Co., Oshkosh, Wis., which recently was organized by Fred E. Zuehlke, Frank Doemel and Joseph Laus, Jr., intends to build a factory to manufacture devices invented and designed by Mr. Laus. The principal specialty is a pneumatic hub for motor vehicle wheels and obviates the necessity of using pneumatic tires. The company is capitalized at \$20,000 and has excellent backing.

Stevens-Duryea Secures Richards—To enable its body engineer, George W. Kerr, who since the establishment of the company's body plant at East Springfield, Mass., has acted as manufacturing superintendent, to devote his entire time to the designing and engineering department; the Stevens-Duryea Co., Chicopee Falls, Mass., has secured the services of John B. Richards as manufacturing superintendent.

Four-Wheel Drive Prosperous—All officers were re-elected at the annual meeting of the Four-Wheel Drive Automobile Co., Clintonville, Wis., and reports showed that the com-

pany is now at the most prosperous stage in its career. New buildings and extensions are being completed, and on August 1 the output was increased to fifteen trucks per month. The concern has some excellent contracts with the U. S. government for army vehicles, and is building a general line of trucks employing four-wheel drive in 1 1-2 and 3-ton sizes.

Morgan & Wright Moves—The Morgan & Wright factory of the U. S. Tire Co. is just moving in to a group of new buildings at its Detroit, Mich., plant which will give it 400,000 square feet additional floor space. This means a capacity for a 50 per cent. increase in production. Work has also been started on more additions which will add another 400,000 square feet of space, which the company expects to occupy the last of March or the first of April, 1914. In order to take care of the increased production facilities the company's power plant has been doubled.

Davis Erects \$150,000 Plant—The Davis Manufacturing Co., Milwaukee, Wis., builder of motors, has purchased a site of 7 acres at West Allis, the manufacturing suburb of Milwaukee, upon which it will immediately begin the erection of a \$150,000 motor plant. This will be the third plant erected by the Davis company in 10 years. The new plant will employ 1,600 men, as compared with 650 at present. The main shop will be 250 by 290 feet in size, and the administration building 40 by 100 feet. Frank M. Davis is president; John J. Thompson, vice-president; J. B. Whitnall, treasurer, and George W. Kliegel, secretary.

The Automobile Calendar

Shows, Conventions, Etc.

- Sept. 17-18.....Cleveland, O., Annual Meeting of the National Brick Manufacturers Assn.
- October 13.....Philadelphia, Pa., National Fire Prevention Conference. Philadelphia Fire Prevention Commission.
- Oct. 27-28.....Chicago, Ill., Convention of Electric Vehicle Association of America.
- Dec. 9-12.....Philadelphia, Pa., Annual Convention of American Road Builders' Association.
- Dec. 11-20.....New York City, First International Exposition of Safety and Sanitation, under the auspices of the American Museum of Safety.
- Jan. 3-10, 1914....New York City, Automobile Show, Grand Central Palace.
- Jan. 24-31, 1914....Chicago, Ill., Automobile Show, Coliseum and First Regiment Armory.
- Jan. 26-31, 1914....Scranton, Pa., Automobile Show, Automobile Assn. of Scranton.
- Jan. 31-Feb. 7, 1914.....Minneapolis, Minn., Automobile Show.
- Feb. 21-28, 1914....Newark, N. J., Automobile Show, N. J. Auto Trade Assn.

Race Meets, Runs, Hill Climbs, Etc.

- Aug. 20-21.....Newport, Ind., Hill Climb, Newport Motor Club.
- Aug. 25-28.....Houston, Tex., Reliability Run, Houston Auto Club.
- Aug. 25-30.....Cleveland, O., Midsummer Show, Forest City Fair. Cleveland Automobile Show Co.
- Aug. 29-30.....Elgin, Ill., Elgin Road Races, Elgin Road Race Assn.
- Aug. 30-Sept. 6.....Chicago, Ill., Reliability Run, Chicago Motor Club.
- September.....Grand Rapids, Mich., Tour, Grand Rapids Auto Club.
- Sept. 1.....Columbus, O., 200-Mile Track Race, Columbus Automobile Club.
- Sept. 1-2.....Sioux City, Ia., Track Race, Sioux City Auto Club & Speedway Assn.
- Sept. 8-13.....Chicago, Ill., Around Lake Michigan Run, Chicago Motor Co.
- Sept. 9.....Corona, Cal., Track Race, Corona Automobile Assn.
- Sept. 12.....Canfield, O., Track Meeting, Canfield Fair Assn.
- Sept. 13.....Covington, Ky., Track Meeting, Cincinnati Automobile Club.
- Sept. 13.....Grand Rapids, Mich., Track Races, Grand Rapids Automobile Club.
- Sept. 20-21.....Detroit, Mich., Track Races, Michigan State Fair.
- Nov. 4-5.....El Paso, Tex., Road Race to Phoenix, Ariz.
- Nov. 4-5.....Los Angeles, Cal., Road Race to Phoenix, Ariz.
- Nov. 4-5.....San Diego, Cal., Road Race to Phoenix, Ariz.
- Nov. 6.....Phoenix, Ariz., Track Meeting, State Fair.
- Nov. 24.....Savannah, Ga., Vanderbilt Cup Race, Motor Cups Holding Company.
- Nov. 27.....Savannah, Ga., Grand Prize Race, Automobile Club of America.

Foreign

- Aug. 28-30.....Ghent, Belgium, Institute of Metals, Annual Autumn Meeting, Ghent, International Exhibition.
- Sept. 21.....Boulogne, France, 3-Litre Race.
- Sept. 25.....Isle of Man, International Stock Car Race.
- October 17-28.....Paris, France, Automobile Show, Grand Palais, 10 days.
- November.....London, Eng., Annual Automobile Exhibition, Olympia.

The Week in the Industry

Engineer Dealer Repairman Garage

MOTORIZE CANADA'S MOUNTED POLICE—The question of providing police subdivisions in Western Canada with automobiles is raised by the department at Ottawa, Can. It is reported to be the intention of the department to procure two automobiles for each of the nine districts or divisions of mounted police in the northwest, the cars to cost in the neighborhood of \$3,000 each. Nearly all of the districts consist of two sub-districts and one automobile will be allotted to the headquarters of each subdivision. It is believed that more efficient and better work can be accomplished by the mounted police with automobiles than with horses. It is proposed to purchase about twenty Cadillac cars of the touring class, but especially designed for police work and equipped with straps and other devices with which a prisoner may be secured.

MCCUSKER SEATTLE LOCOMOBILE MANAGER—Owen McCusker will act as manager of the Locomobile factory branch in Seattle, Wash.

LECKLER MECHANICAL ENGINEER—H. H. Leckler has joined the staff of the Emil Grossman Co., in the capacity of mechanical engineer.

GAULOIS TIRES IN TORONTO—The Gaulois tires are to be sold in Toronto, Ont., through Edgar Walker, who opened a show room at 127 Bay street.

URBAN MOVES QUARTERS—F. J. Urban, sales manager of the Remy Electric Co., has removed his headquarters from Chicago, Ill., to the factory at Anderson, Ind.

HERTZ RESIGNS—A. H. Hertz has resigned from the management of the Seattle, Wash., branch of the Gerlinger M. C. Co., and C. W. Dansie has been installed as manager.

APPOINTED LOZIER SALES AGENT—A. R. Dawson has been appointed factory sales agent for Lozier cars. His territory will be Nevada, Arizona, Western Oregon and California.

A NEW TIRE AGENCY—G. and E. Tisch of Grand Rapids, Mich., have been appointed agents for the Federal Rubber Mfg. Co., of Milwaukee, Wis., handling its automobile tires.

RAISES AUTOMOBILE BAN—Verdugo Park, Los Angeles, Cal., has recently raised the ban on automobiles, and tourists who now take the Glendale-La Canada boulevard route may stop in this lovely park.

REGISTRATIONS PASS 75,000 MARK—Pennsylvania state automobile license registrations passed the 75,000 mark this week. This is over 14,000 beyond the total for 1912. It represents an income of over \$750,000.

IN NEW PLAINFIELD GARAGE—The Standard Automobile & Tire Co., Inc., Plainfield, N. J., has just moved into its new building on Somerset street, that city. The building is 60 by 100 feet in size, and is strictly fireproof.

PATROL WAGON EQUIPPED WITH PULMOTOR—A new motor patrol wagon, purchased by the police department of Canton, O., is equipped with a pulmotor for the purpose of resuscitating persons drowned, electrocuted or asphyxiated.

BEE EDISON VICE-PRESIDENT—Mr. Wm. G. Bee, who has been connected with Thomas A. Edison for the past 11 years, has been elected vice-president and general sales manager of the Edison Storage Battery Co., Orange, N. J.

STILES WESTERN REPRESENTATIVE—John C. Stiles, who has been with the Indianapolis, Ind., sales branch of the Stewart-Warner Speedometer Co., has been advanced to western representative of the company and has located in St. Louis, Mo.

VAN BAALEN RESIGNS—Harold Van Baalen has resigned from the sales force of the Grinnell Electric Co., Detroit, Mich., to become general manager of the Electric Automobile Co. which acts as local distributor of the Standard electric car.

HOOD TIRE AGENT MOVES—Richard C. Skinner, Connecticut representative of the Hood Rubber Co., featuring Shawmut tires and tubes, has removed to 30 Mulberry street, Hartford. A steam vulcanizing plant is operated in connection with the sales department.

PETCHER DETROIT RAYFIELD MANAGER—M. B. Petcher, formerly of the Maxwell Motor Co., has been appointed Detroit, Mich., manager of the Rayfield Carburetor Co., and has moved into new quarters at 1211 Woodward avenue, where he has established a service station.

DIAMOND CO. DISSOLVED—The Diamond Rubber Co., New York, which was chartered in Wisconsin as a foreign corporation, and maintained a branch at Milwaukee until the merger between the Diamond and Goodrich concerns, has filed notice of dissolution at Madison, Wis.

FORSTER RESIGNS FROM MAXWELL—C. A. Forster has resigned his position as commercial manager of the Maxwell Motor Co., Inc., Detroit, Mich., and it is understood that he will return to the Burroughs Adding Machine Co. Mr. Forster was formerly assistant general manager at the Burroughs factory.

RECORD BREAKING DELIVERY—Record breaking time was made by the Oscar Lear Automobile Co. of Columbus, O., in delivering a Kelly truck to the Ohio State Penitentiary. The order was received on Friday afternoon and at 9 a. m. Saturday the truck arrived in Columbus, having been driven from Springfield.

VON DER LEITH RESIGNS—John D. von der Leith, for 5 years connected with the Splittorf Electrical Co., Newark, N. J., has severed his connection with that organization to enter business on his own account. He has formed the Reliable Auto Specialty Co., with headquarters at 306 Mott avenue, New York City.

WHITE RESIGNS FROM MARION—The resignation of W. M. White as advertising manager and a director of the Marion Motor Car Co., Indianapolis, Ind., has been announced. He expects to become identified with an Indianapolis company, but has not announced his plans. He was tour chairman of the Indiana-Pacific tour.

\$50,000 CALGARY FIRE—The Dominion Auto Garage, Calgary, Can., was swept by a disastrous fire recently. Fifteen motor cars, a number of motor

cycles and the whole interior equipment of the buildings were destroyed. The total is estimated at \$50,000. The fire was discovered by a night watchman after it had gained considerable headway. The origin of the fire is a mystery.

NO SPRING SHOWS IN ST. LOUIS—That spring automobile shows in St. Louis, Mo., are things of the past was made certain recently when the Coliseum management announced that it would not rent its building for automobile show purposes. This year's annual show will be held at Forest Park Highlands where 93,000 square feet of space have been set aside for exhibitors.

NEW ALUMINUM WHEEL—Keeler Bros. & Shur of Hibbing, Minn., have contracted with A. J. Johnson foundry and machine shop, Eau Claire, Wis., for the manufacture of the new aluminum wheel invented by the Hibbing men. The wheel works on the piston theory and when applied to motor cars and trucks avoids the necessity of using pneumatic tires. The wheel itself is a pneumatic device.

NEW EDMONTON TAXI CO.—Capitalized at \$100,000, the Capital City Taxi Cab Co., Ltd., has been formed in Edmonton, Alta., with a number of Edmonton's most prominent business members as directors. The company will be ready for business in a short while. This is the second taxi cab company formed. Ten cars of the Laudnet-limousine type have been purchased each costing about \$4,000.

NEW BRIDGE OVER COLORADO—Trouble is being encountered in securing an automobile and wagon bridge across the Colorado River at Yuma, Ariz. The sum, \$50,000, is now available, \$25,000 from the government and \$25,000 from Arizona, but California has not guaranteed to pay her third of the cost. The building of such a bridge would greatly stimulate automobile travel between Arizona and California.

BEEFSTEAK DINNER FOR INDIANA TOURISTS—Motor enthusiasts of Indianapolis will tell those who participated in the Indiana-Pacific tour how glad they are to see them home safely, on August 23. A beefsteak dinner, entertainment and reception is being arranged for that date. During the dinner there will be a high class cabaret performance. Later, lantern slides and moving pictures of the tour will be shown.

BOSCH ENLARGES SERVICE FACILITIES—A New York City branch of the Bosch Magneto Co., of New York, has just been organized. The details of operations previously carried on by the executive officers and staff are now taken care of by the branch, in a field, known as the Eastern territory, made up of all the states east of the Ohio and Mississippi rivers, space in the Bosch Bldg., 223 West 46th street, New York City, has been temporarily made. A. J. Poole, formerly assistant chief engineer, has been appointed branch manager.

A QUEER ONE—Somewhat out of the ordinary was the attitude of a New Jersey motorist who was arraigned in the Thompsonville police court on a violation of the automobile law. The accused was racing his car with another motorist through the main street of the town and to avoid hitting another car took the curb blowing out all four tires and otherwise damaged his car, to the extent of \$175. The judge fined the motorist on his plea of guilty \$15 and costs amounting to \$26.08. The motorist thanked the court for leniency. It was a new one on the judge.

GARAGE PUTS UP BIG MIRROR—The owners of the Hoffman Garage at Bedford, Mass., have taken the initiative in a plan to prevent accidents at a dangerous curve on the State highway in that town at what is called The Narrows, by placing a big mirror at an angle to the road so that persons approaching the curve from either direction can see the road beyond for a considerable distance. It works well at night as well as by day, and the matter has been called to the attention of motor associations in Massachusetts so that other mirrors may be placed elsewhere at dangerous curves.

PENNSYLVANIA GOOD ROADS ASSOCIATION—The Pennsylvania Good Roads Association was launched at a recent meeting held at Harrisburg, Pa. The meeting was attended by men from all parts of the state, including members of conservation, granger, hotel, motor and other bodies interested in good roads. A temporary organization was effected with ex-Senator John S. Fisher, of Indiana, as president. It was decided to affiliate with the national good roads movement, and this organization will become the Pennsylvania division of the National Highway association. The new association endorsed the work of the Pennsylvania Motor federation and voted to assist it in its campaign for good roads.

NEW ROAD SURFACING PATENT—Patents have been issued to J. W. T. Stephens, a civil engineer of New Orleans, La., for a road surfacing material, which promises to become a utility of national importance. By using a portable furnace with a revolving drum all vegetable matter is burned from a layer of dirt scraped from the crown of the road. While hot the dirt is mixed with a cheap oil residuum. Only ten per cent. of the volume is the oil content, which results in a cheap surfacing material. Patents have been granted on the furnace and mixer, which is mounted on wheels. Sample pieces of road which have been laid in the vicinity of New Orleans are said to be giving excellent results.

HAS VACUUM WINDOW PATENT—The Anderson Electric Car Co., Detroit, Mich., which makes the Detroit Electric, has announced the purchase of the entire right to the Hanlon patent for vacuum car windows. The construction covered by the patent is a glass shield which is hinged at the top of the front window and arranged so that it may be adjusted from the inside of the car. When protection is desired from rain, snow or dust, this glass is tilted down so as to keep them out, but does not interfere with the driver's view, because his line of vision of the road passes below the lower edge of this glass. If it is desired to have the front of the car entirely open, the protecting window is tilted up entirely out of the way. When brought all the way down, it keeps the regular front window from frosting in winter. The Anderson Co. has developed a window under this patent which is especially designed for their car, and will equip the 1914 Detroit Electrics with it.

McIntyre Gets New Job—A. H. McIntyre, well known in oil circles, is now the New England district manager for the J. I. Handley Co., maker of Marion and American cars. He will make his headquarters in Boston.

Big Increase in Sales—The American-La France Fire Engine Co., Elmira, N. Y., maker of motor fire apparatus, sold 200 pieces of fire-fighting trucks during the first 7 months of this year, according to monthly report just completed by manager Rhoades. This is 50 per cent. better than the business during the same period last year, and the prospects indicate that this year's receipts will constitute a record maker in history of the local concern. The first truck in the order of twenty-five for New York City department was delivered recently.

ONTARIO LEAGUE GIVES \$10,000,000—At a special meeting of the board of directors of the Ontario Motor League, Toronto, Ont., it was announced that the Ontario government had appointed a Good Roads Commission to look after the highways in Ontario and that \$10,000,000 would be granted for the purpose. In consequence of the many fines which have been imposed on motorists for driving at a rate over 15 miles an hour in certain municipalities where there are no boundary limit signs it was stated that the road signs committee had erected 1000 road signs and were engaged on a road signs scheme which would embrace the entire province. At the meeting seventy-five new members were admitted, bringing the membership of the league up to 3600 motorists.

Recent Incorporations in the Automobile Field

AUTOMOBILES AND PARTS

BIRMINGHAM, ALA.—Haynes Motor Co.; capital, \$10,000; to deal in automobiles.

BOSTON, MASS.—Marathon Automobile Co. of Boston; capital, \$2,500. Incorporators: Wm. Sanford, Gernard Killars, A. L. Schoolcraft.

BROOKLYN, N. Y.—Rambler Motor Car Co.; capital, \$5,000; to deal in automobiles. Incorporators: G. R. Ruckert, B. F. Donnocker, J. B. Smith.

CHICAGO, ILL.—F. A. Woods; capital, \$12,000; to deal in automobiles. Incorporators: F. A. Woods, Frances Armstrong Woods, E. F. Blettner.

CINCINNATI, O.—Cincinnati Automobile Clearing House Co.; capital, \$5,000; to deal in automobiles. Incorporators: Robert Uricho, C. F. Hornberger, A. R. Shangenburg, C. P. Chadwick, S. D. Bromley.

DETROIT, MICH.—McClintock Engine Co.; capital, \$200,000; to design, install and equip and otherwise deal in all kinds of combustion and other engines. Incorporators: F. C. Osborn, G. E. Allen, C. D. McClintock.

FORT WORTH, TEX.—Chandler M. C. Co.; capital, \$5,000; to deal in automobiles. Incorporators: B. K. Smith, M. H. Smith, R. E. Southern.

LEXINGTON, KY.—Kentucky Kissel Kar Sales Co.; capital, \$1,200; to deal in automobiles. Incorporators: S. H. Halley, O. R. Hukle, P. M. Justice.

LOGANSPOUT, IND.—The Auto Distributors Co.; capital, \$10,000; to deal in automobiles. F. C. King, O. H. Binns, A. E. Binns.

LOUISVILLE, KY.—Chawck-Smith Auto Co.; capital, \$4,500; to buy, sell and rent automobiles. Incorporators: J. T. Chawck, W. J. Chawck, H. R. Smith.

LOUISVILLE, KY.—Monarch Auto Co.; capital, \$10,000; to deal in automobiles. Incorporators: C. H. Pierson, J. T. Gosnell, A. T. Wingate, J. T. Wingate.

NEW YORK CITY—Army Tire Co.; capital, \$1,000,000; to engage in the manufacture, sale and maintenance of automobiles and all other kinds of wheeled vehicles.

NEW YORK CITY—H. C. Well Perfect Motor Co.; capital, \$25,000; to deal in automobiles, etc. Incorporators: F. A. B. Meinhardt, H. C. Well, M. M. Well.

NEW YORK CITY—Velvet Co.; capital \$5,000; to manufacture motors. Incorporators: W. D. Ramsburgh, H. C. Proctor, A. H. Miller.

SAN MARCOS, TEX.—Bradley Moore Auto Co.; capital, \$6,000; to deal in automobiles. Incorporators: J. M. Moore, Frank Bradley, I. W. Wood.

ST. LOUIS, MO.—Palmer Meyer M. C. Co.; capital, \$100,000; to deal in automobiles and specialties. Incorporators: C. W. Palmer, F. C. Meyer, F. A. Meier.

WILMINGTON, DEL.—The Feld Omnibus Co.; capital, \$500,000; to manufacture omnibuses, motor trucks, etc.

WILMINGTON, DEL.—The Muier Co.; capital, \$100,000; to manufacture, sell and deal in and with automobiles. Incorporators: S. E. Roberson, C. J. Jacobs, H. W. Davis.

GARAGES AND ACCESSORIES

BOSTON, MASS.—Blue Hill Avenue Garage, Inc.; capital, \$10,000; to engage in automobile garage business. Incorporators: F. H. Sideellinger, W. A. Clark.

BOSTON, MASS.—Moebus Wheel Co.; capital, \$100,000; to manufacture automobile wheels. Incorporators: A. F. McGettrick, G. B. Ryan, H. W. Brown.

BROOKLYN, N. Y.—Ohlsson Spring Tire Co.; capital, \$30,000; to manufacture and deal in automobile accessories. Incorporators: C. J. Ohlsson, Joseph Maddocks, P. J. Buttery.

CHICAGO, ILL.—Orphans' Automobile Day Assn. of Chicago; to conduct automobile outings for poor and orphan children of Chicago. Incorporators: G. B. Foster, H. E. Mesz, B. B. Barker.

CLEVELAND, O.—Velle Paige M. C. Co.; change of name to the Velle M. C. Co. of Cleveland.

COFFEYVILLE, KAN.—The Isham Garage Co.; capital, \$5,000; to carry on a general garage business. Incorporators: E. H. Hess, G. N. Upham, S. H. Hess, C. D. Welch, Gus Bayless.

COLD SPRING, N. Y.—H. F. L. Funke Co.; capital, \$10,000; to deal in auto-

mobile supplies. Incorporators: H. M. Brigham, Aaron Michelson, H. F. L. Funke.

DOVER, DEL.—Havan Motor Omnibus Co.; capital, \$1,000,000; to operate an automobile bus line.

FALCONER, N. Y.—Falconer Iron Works; capital, \$15,000; to operate general iron works and machine shop. Incorporators: G. L. Gilbert, J. C. Wright, J. S. Wright.

INDIANAPOLIS, IND.—The Auto Inn Club; to operate an automobile club. Incorporators: P. L. Jolly, F. Tucker, A. L. Ricketts.

KENOSHA, WIS.—R. J. Murray Mfg. Co.; capital, \$10,000; to conduct a general metal manufacturing and repairing business. Incorporators: R. J. Murray, J. B. Butcher.

MANSFIELD, PA.—W. W. Taylor Mfg. Co.; capital, \$50,000; to manufacture tools. Incorporators: F. E. Harding, L. A. Chandler.

MILWAUKEE, WIS.—Milwaukee Grinding Wheel Co.; capital, \$65,000; to manufacture disc grinders, emery wheels, abrasives, etc., for garage, farm and machine shops.

NEW YORK CITY—Auto Pedal Pad Co.; capital \$10,000; to manufacture pedal pads and other automobile accessories. Incorporators: Henry Reich, E. M. Lichter, G. T. Young.

NEW YORK CITY—Bavler Lubrication System, Inc.; capital, \$10,000; to manufacture and develop systems for lubricating automobiles. Incorporators: Emanuel Weil, G. H. Duck, C. S. Bavler.

NEW YORK CITY—Bobta Spark Plug Co.; capital, \$12,000; to deal in automobile accessories. Incorporators: William Bohleber, C. H. Braselton, C. L. Bundy.

NEW YORK CITY—Caledonian Oil Co.; capital, \$10,000; to produce and deal in lubricating oils. Incorporators: J. E. Hernandez, A. B. Brushaber, Harry Hess.

NEW YORK CITY—McGraw Tire and Rubber Co.; capital, \$1,000,000; to deal in automobile tires. Incorporator: R. F. Hobron.

NEW YORK CITY—Metropolitan Public Motor Corp.; capital, \$1,000; to carry on an automobile bus line. Incorporators: J. O. Tyron, E. A. Mathews, C. R. Olenka.

NEW YORK CITY—The Eclipse Garage Co.; capital, \$6,000; to carry on a garage business. Incorporators: T. J. Cardiff, W. A. Builder, John Mano.

OSHKOSH, WIS.—Oshkosh Pneumatic Hub Co.; capital, \$20,000; to manufacture and market a new type of hub for wheels for motor vehicles. The capital stock is \$20,000.

PHILADELPHIA, PA.—Motor Betterment Co.; capital, \$5,000; to deal in equipments and attachments for engines and motors. Incorporators: W. P. Owen, J. Williams, G. H. Shearer, Jr.

PITTSBURGH, PA.—Chester Rubber Tire & Tube Co.; capital, \$250,000; to manufacture, sell and deal in and with rubber and tubing for all kinds of automobiles. Incorporators: Morgan Howell, Ephraim Lyon, C. E. Jarvis.

SHARON SPRINGS, N. Y.—Sharon Springs and Canajoharie Auto-Bus and Car-Line Co.; capital, \$1,000; to operate an automobile bus line. Incorporators: W. H. Craig, O. E. Elgen, C. R. Winnie.

STAMFORD, CONN.—The North Stamford Avenue and Long Ridge Road Auto Bus Co.; capital, \$6,000; to carry on an automobile bus line. Incorporators: M. J. Porter, J. F. Dunn, Henry Miller, John Gutzon de La Mothe Borglum, C. J. Weinz, W. P. Terry, C. F. Waterbury.

WETHERSFIELD, CONN.—J. N. Macdonald Co.; capital, \$5,000; to do a general repair business. Incorporators: James Macdonald, R. D. Britton, S. M. Lynihan.

WILLIAMSVILLE, N. Y.—Williamsville Auto Repair and Garage Co.; capital, \$500; to engage in a general garage business. Incorporators: S. A. Hirsch, Christine Hirsch, G. W. Walters.

CHANGES OF NAME AND CAPITAL

KENOSHA, WIS.—Littand Mfg. Co.; increase of capital from \$25,000 to \$40,000.

PITTSBURGH, PA.—Westinghouse Air Spring Co.; capital increased from \$200,000 to \$250,000.

WATERBURY, CONN.—Taxi Service Co.; capital increased from \$10,000 to \$20,000.

New Agencies Established During the Week

PASSENGER VEHICLES

Place	Car	Agent
Auburn, Ind.	Imp. Cycle Car	MacArthur, Thompson, Kollars
Beloit, Kan.	Cartercar	W. C. Brown
Birmingham, Ala.	Haynes	Haynes Motor Co.
Brunswick, Neb.	Metz	D. W. Geary
Brunswick, Neb.	Overland	C. J. Rasmussen
Cincinnati, O.	Studebaker	Twyman M. C. Co.
Columbus, O.	Studebaker	Twyman M. C. Co.
Coshocton, O.	Westcott	D. G. Gale
Dayton, O.	Studebaker	Twyman M. C. Co.
Detroit, Mich.	Lozier	Wetmore-Quinn Co.
Detroit, Mich.	Paige-Detroit	Wetmore-Quinn Co.
Fond du Lac, Wis.	Premier	E. W. Clark Motor Co.
Indianapolis, Ind.	Alco	H. L. Archey
Los Angeles, Cal.	Overland	H. O. Harrison
Louisiana, Mo.	Overland	B. E. Backer & T. E. Backer
Mexia, Tex.	Krit	Joseph Nusbaum & Co.
Minneapolis, Minn.	Chandler	Northwestern Auto Co.
Minneapolis, Minn.	Mets	Fawkes Auto Co.
Morgan, Tex.	Krit	S. J. Covey
Overton, Tex.	Krit	J. O. Tucker
Philadelphia, Pa.	Lozier	Bigelow-Willey Co.
Philadelphia, Pa.	Marion	R. D. Earle
Philadelphia, Pa.	Paige-Detroit	Bigelow-Willey Co.
Pittsburgh, Pa.	Lozier	Averman-Lynn, Inc.
Portland, Ore.	Maxwell	Boone, Skinner & Co., Inc.

Place	Car	Agent
Putnam, Tex.	Krit	C. T. Hutchinson
San Francisco, Cal.	Great Western	Interstate Motors Co.
San Francisco, Cal.	Inter-State	Interstate Motors Co.
San Francisco, Cal.	King	E. Stewart Auto Co.
San Francisco, Cal.	Piggens	Interstate Motors Co.
Spokane, Wash.	King	O. H. Hornberg Auto Co.
Spokane, Wash.	Maxwell	O. H. Hornberg Auto Co.
Spokane, Wash.	Stoddard-Dayton	O. H. Hornberg Auto Co.
Springfield, Ill.	Franklin	City Garage
Vevay, Ind.	Franklin	C. S. Tandy
West Point, Neb.	Ford	M. F. Helm
Worcester, Mass.	Pullman	Peter Wilbur
York, Pa.	Franklin	T. S. Pfeiffer

COMMERCIAL VEHICLES

Boston, Mass.	Wagenhals	M. B. M. Motor Co.
Hartford, Conn.	Selden	Keeney Garage
Philadelphia, Pa.	Federal	Bigelow-Willey Co.
Philadelphia, Pa.	Standard	Bigelow-Willey Co.
Sacramento, Cal.	Lincoln	Hirsch Auto Co.
San Francisco, Cal.	Commercial	Olsen-McFarland Co.
Warrensburg, Mo.	Kissel Kar	Rube Oglesby

ELECTRIC VEHICLES

Boston, Mass.	Ohio	D. C. Tiffany Co.
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C. M. B. Socket Wrenches—Inaccessible nuts and bolts may be easily handled by the special socket wrenches made by the C. M. B. Wrench Co., Garwood, N. J. In these wrenches, the handle is made adjustable in shape, so that it may be brought around whatever obstacle prevents the application of ordinary wrenches. Each outfit includes a handle and twenty-four sockets.

New Springfield Tire Tool—Fig. 1 shows a device which will be appreciated by thousands of automobilists to be of decided assistance in such a necessary operation as the changing of tires, especially such of the clincher type. The tool is made by the Shawver Co., Springfield, O., and consists of two simple parts, a long lever carrying a tong grip passed between the spokes and laid firmly on the rim and a short grip which is applied to the tire casing just above the bead fitting in the other side of the rim. The small grip raises the tire tread from its engagement with the rim, so that it may be taken off the rim.

Apco Ford Spark-Plug—The Auto Parts Co., Providence, R. I., is now making a special spark-plug designed for Ford cars, Fig. 2, which has such a long body that it may easily be taken out of the cylinder. The long steel shell has the negative electrode attached to it, while the positive is held in a porcelain insulation, securely in place inside the shell by means of a hexagonal binding nut. An oil drip point is one of the features of this plug, and it is due to this that the spark gap is never shortcircuited by oil or deposits formed from its products of decomposition. Pleasing exterior is obtained by nickel plating which covers all parts of the plug equally.

Polo Pneumatic Tire Alarm—Granting that tire deflation is one of the principal causes of shortened tire life, and that gradual escape of the air from the tire cannot well be prevented, the use of a signal which indicates when the pressure falls below a certain point is very desirable. Fig. 3 illustrates a device which has been constructed just for this purpose. The Polo Pneumatic Alarm Mfg. Co., Clear Lake, S. D., is the maker of this product. It consists of a whistle attached to a metal cap which screws on the end of the tire valve casing in place of the conventional cap. A long screw bolt fitting into the end of the piece which seats on the valve casing bears on a coil spring which governs a passage between the piece mentioned and the whistle. The pressure of the bolt on the spring is balanced by the high air pressure inside the valve, but if this pressure sinks, air is admitted to the whistle and a shrill warning sound issues from the latter. By varying the degree to which the bolt is screwed into

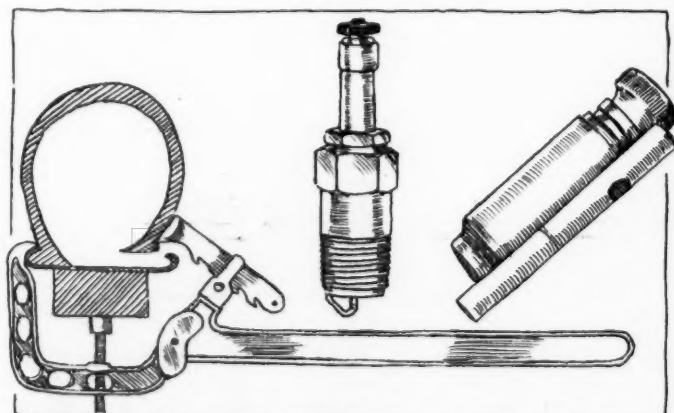


Fig. 1—Springfield tire tool. Fig. 2—Apco Ford plug. Fig. 3—Polo tire deflation alarm

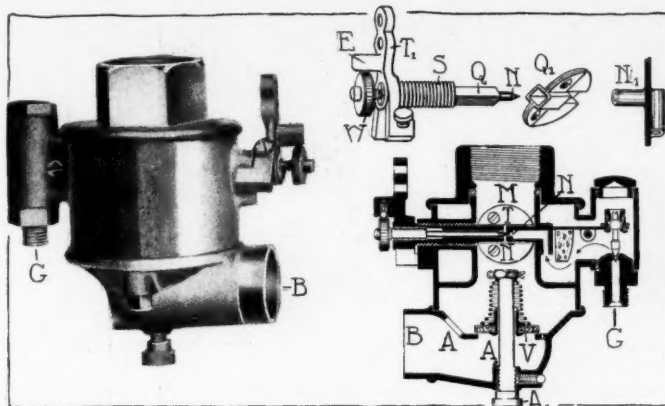


Fig. 4—Outside of Eiker Carburetor. Fig. 5—Section of same

the piece the low pressure below which the signal is given can be adjusted.

Stewart-Warner Tire Air Pump—The Stewart-Warner Corp., Beloit, Wis., long known as a leading speedometer manufacturer, has added to its line the tire-inflating pump, Fig. 6. This device is a four-cylinder pump, made in a water and an air-cooled type. It is 7.5 inches long, 4 inches wide and 8 inches high. Four cylinders are cast integrally with the upper half C of a crankcase, to which the lower or base chamber B is bolted at B1. The casting is of fine grey iron. Pistons P with die-cast heads work in the cylinders, each being equipped with two fine grey-iron compression rings R. The connecting rods work on a drop-forged, .75-inch crankshaft, being lubricated by a splash system; oil may be filled into the crankcase through a filler O. As each cylinder has 1.4375 inches bore and 1.125 inches stroke, the volume of air pumped at each revolution of the crankshaft is 7.3 cubic inches. The air enters an oblong space surrounding all cylinder intake ports through holes A, formed in a screen and is discharged under pressure by the pistons through valves in the cylinder heads, being forced through A1 into the inflating hose. In the water-cooled type, a jacket J is used which the water enters at E, leaving at L. The drive is from the pump or magneto shaft.

Eiker Automatic Carburetor—A novel carburetor, made by the Eiker Carburetor Co., 1790 Broadway, New York City, has been brought out recently; it is illustrated in Figs. 4 and 5. The device is of the concentric float type and enclosed in a cylindrical housing. All the fuel enters at G and all air at B. The details of the construction are seen in Fig. 5. Gasoline enters the float chamber through a passage G controlled by a needle-valve, fills the chamber and also a passage extending centrally into the throttle way and opening into a nozzle N1. Into the latter fits a needle valve N, the squared end portion Q of which passes through a suitably

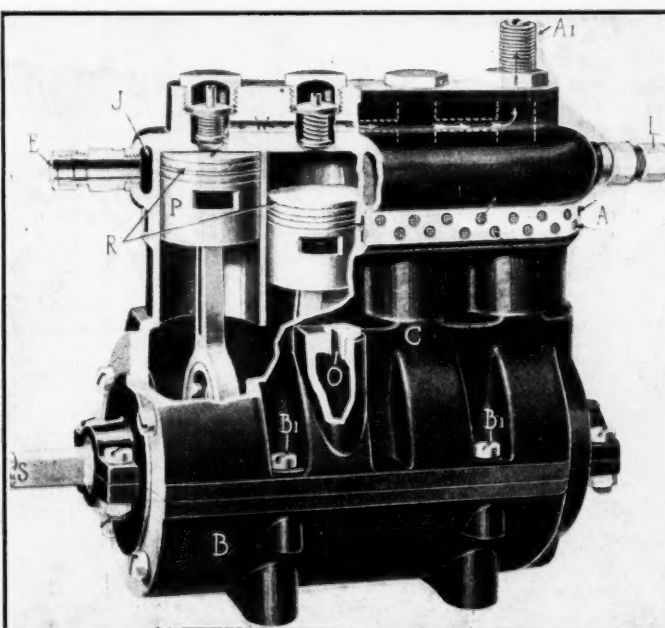


Fig. 6—Stewart-Warner four-cylinder tire-inflating pump

shaped portion Q1 of the throttle T, its more distant portion being threaded to screw into the carburetor housing; the end carries a notched wheel W engaged by a knob on an extension E of the throttle operating lever T1. Consequently, when the wheel W is turned, the screw is moved in the thread of the carburetor housing, and the needle N1 is advanced or drawn back with respect of the nozzle N1. Also, if throttle T is turned, the square fit of Q and Q1 causes N to slide to the left in Fig. 5, whereby the opening of the nozzle N1 is increased. The air which passes by the throttle, vaporizing the gasoline which comes through N1 enters through the opening B and aperture A at low speeds. If the motor throttle is opened wider, the increased suction brings into action the opening A2 controlled by the valve V. By turning the screwhead A1, the compression of the spring above V is variable. Thus, the carburetor has only two adjustments, one for fuel and one for air.

Omaha Automobile Seat Covers—The Omaha Auto Top Co., 713 South Fifteenth street, Omaha, Neb., makes the seat covers shown in Fig. 7, applied to a Hupmobile. The set is made of very good fabric material and fits over doors, cushions and seat backs, there being also a hood for the top, when the latter is down. The appearance is in consequence very neat, as a system of buttons and holes is used on the doors and holes and wingnuts on top and seat back covers.

J.-N.-S. Auto Washing Brush—Jos. N. Smith & Co., Detroit, Mich., have taken up the manufacture of a motor brush, Fig. 8, which combines the working possibilities of a brush with those of a nozzle for spraying water over the cars. The water passing through the hose is thereby distributed through and all over the brush and leaves it as a broad, soft stream, easily applied and intensified by the work of the brush itself. It cannot scratch any part of the car, yet by bringing it sufficiently close to the same, the water is made to work hard upon it and remove all dirt.

Turner Motor Washer—Well-known as a maker of blow torches, the Turner Brass Works, Sycamore, Ill., has entered a new field by announcing its latest product, a motor washer which is constructed on a similar principle as the torches. Fig. 9 shows the washer, consisting of a tank, a handpump attached to it, an outlet for the washing liquid and a valve for regulating its flow, as well as a pressure gauge. The action of the device is as follows. The valve for the outlet of the fluid is closed tightly and the handpump worked until a specified pressure is indicated by the gauge. The air thus pumped into the tank is stored above the fluid, and when the valve is opened, the latter is driven out by the air, the intensity of the flow depending upon the air pressure and the degree of opening of the valve.

Universal Repair Boot "Junior"—Fig. 10 shows the Junior Universal quick repair boot made by the Universal Tire Protector Co., Angola, Ind., which, in addition to the features of the other type, is equipped with an adjustable inflation anchor. The latter consists of a double-loop, double-studded grip for the wheel felloe with a pair of 1.5 inch anchor straps riveted to the boot edge. The boot is fitted over the tire when the latter is deflated, the straps being adjusted properly in the felloe grip, and by inflating the tire the boot is made to fit tightly.

National Power Tire Pump—The National Motor Supply Co., 5606 Euclid avenue, Cleveland, O., manufactures the tire pump, Fig. 11. This device is operated by suction and compression in an engine cylinder to which it is attached by a connection fitting in the place of the spark-plug. It consists of a cylinder made up by a two-section casing C, which is parted in two divisions by a central separating plate S. The latter has a central hole, through which rod T passes; the latter carried a piston P at one end and one R at the other. The rod is hollow, and its interior communicates

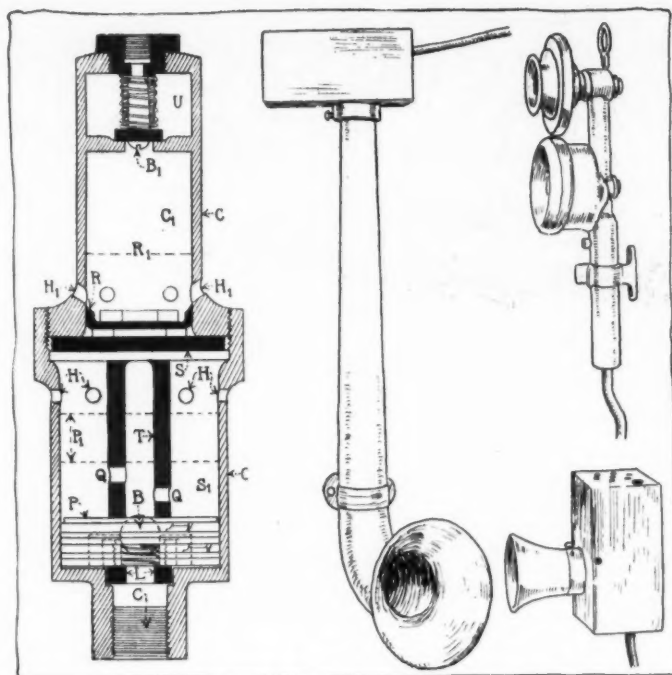


Fig. 11—National tire pump. Fig. 12—O'Brien limousine telephone

with the space S1 between the two pistons by means of holes Q, being closed at times, by the ball valve B carried in piston P. The space in which B is carried is in communication with the space below P and opening into the cylinder, by passages bored through P, so that air may take this way, as indicated by the arrows passing through P. The operation of the pump is as follows:

On the suction stroke of the cylinder, P is drawn down and so is R, the consequent suction in spaces C1 and S1 filling these with air through H1 and H2. The air in S1 passes into the cylinder of the motor through the passage which is bored through P, while B is seated tightly. At the end of the suction stroke, not only the motor cylinder, but also spaces S1 and C1 are full of air. On the return of the motor piston, P and R are also lifted and after having reached the positions indicated by the dotted lines marked P1 and R1, all holes H1 and H2 are closed. The air in C1 is compressed and through the passage governed by valve B1 escapes into the tire inflating hose, while the rising pressure in the motor cylinder drives the air past B, and that air which is in S1 passes through Q into the interior of T and thence into the hose. The space U above B1 prevents the loss of compressed air.

O'Brien Automobile Telephone—With closed cars the giving of instructions to the chauffeur is sometimes a matter as difficult as it is troublesome, especially in noisy streets, and to overcome this difficulty, the Joseph F. O'Brien Mfg. Co., New York City, has evolved the limousine telephone, Fig. 12. This consists of a passenger 'phone composed of a mouthpiece and receiver, and a chauffeur's instrument in which mouthpiece and receiver are formed in one piece, together with the necessary terminals and wiring for connecting the devices to the battery system of the automobile. The chauffeur's instrument is so constructed that, it hanging near him, its sound is audible in the loudest street noise, while the sound of his language is of normal strength to the passenger riding inside the car.

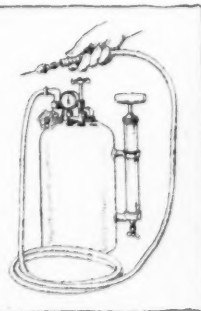
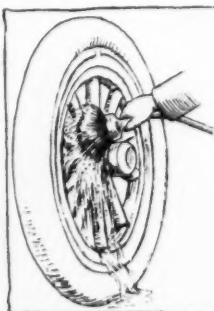
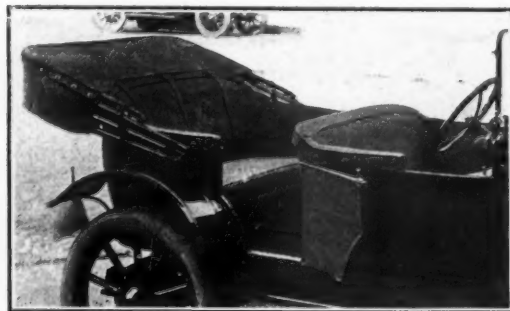


Fig. 7—Omaha seat covers. Fig. 8—J.-N.-S. automobile washing brush. Fig. 9—Turner motor washer. Fig. 10—Universal repair boot Junior